DECEMBER 1992
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CIO

VOLUME 6, NUMBER 5

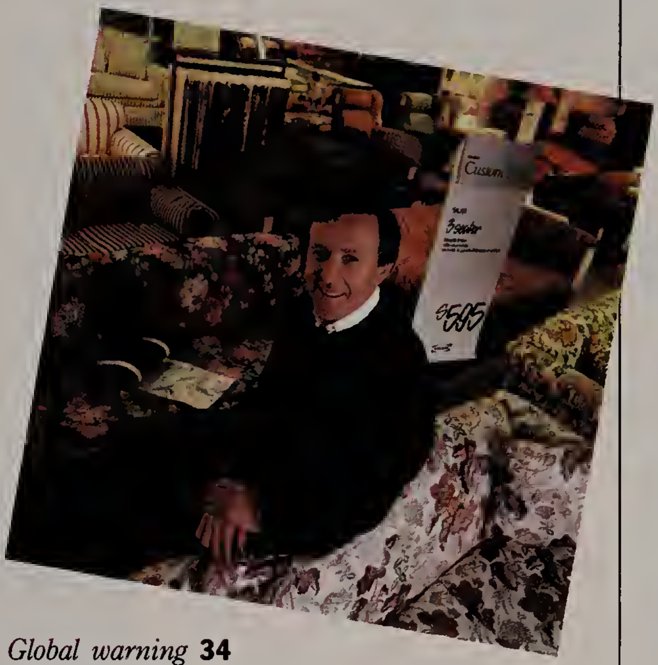
COVER STORY

International Affairs

34

The CIOs of companies venturing into foreign markets quickly realize that a global network and state-of-the-art information systems will take them only so far. Cultural constraints—and the sheer difference in scale of most markets compared to the U.S.—often call for a new technology approach.

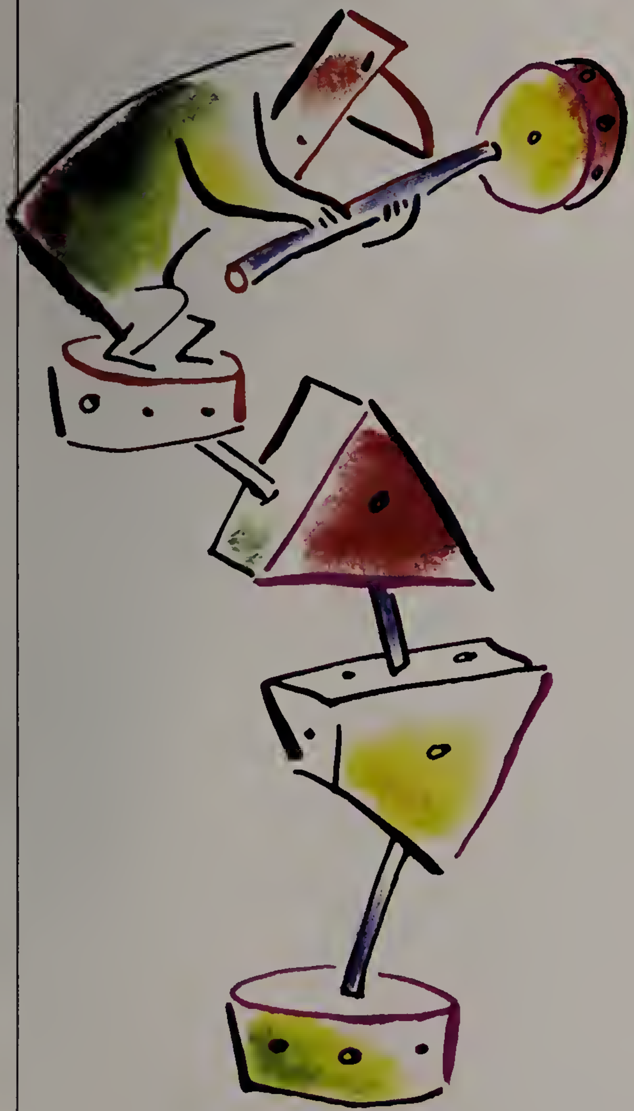
By Allan E. Alter



Global warning **34**
Cover photo by Eugene Mopsik

FEATURES

Building confidence **28**



The Object of Their Affection

28

When it comes to development tools, CASE has a much higher visibility and penetration than object programming. But the few intrepid souls who are experimenting with object expect this relatively untested tool to produce dramatic improvements in efficiency and productivity.

By Meghan O'Leary

Pen and Inc.

46

In a variety of environments, the pen is proving to be a convenient tool for data entry, manipulation and retrieval. And while pen computers have yet to take the business world by storm, it isn't too early for even the most cautious CIO to consider where pen technology might be used effectively.

By Lucie Juneau

The Year in Review

54

An index of all major articles published in *CIO* in 1992, including a cross-reference by article type.

MORE ▶▶▶

Program Highlights

Jim Wetherbe, Director, MIS Research Center and Professor of MIS, Carlson School of Management, University of Minnesota, will again serve as conference moderator.

Among the Presenters...

◀ Bill Davidow

General Partner, Mohr,
Davidow Ventures & author
The Virtual Corporation:
Landscape for the Future

Leif Edvinsson

Director of Intellectual Capital
Skandia Group
Capitalizing on
Intellectual Assets

▶ Regis McKenna

Founder & Chairman
Regis McKenna, Inc.
A Marketing Approach
to Aligning Business
& IT Strategy

▼ Bob Reich

Economist; Professor, Kennedy School of Government, Harvard University; Author & Clinton/Gore Advisor
The Era of Human Capital

RICHARD SOBOL

Kathy Brittain White

Vice President, Corporate
Services, Guilford Mills
I'm Their Leader; Which
Way Did They Go?

Janet Wilson

Vice President, Information
Technology, FirstLine Trust
Downsizing during
Rapid Growth

Integrating Enterprise-wide Assets

The business world is hungry for payback and profit. If you think of information systems as assets to be deployed, you are on your way to connecting technology strategy to the enterprise. But to make this connection, you must integrate information technology with your organization's other critical asset goals. People, and the intangibles they bring — their knowledge, their abilities, the processes they carry out to get their jobs done — are one kind of asset. Another is a company's "hard" property — cash, equipment, physical plant, data.

The combination of people, property and IT — integrated for peak performance — is the soil from which enterprises grow. What is the best way to balance and exploit these assets to reap the highest possible performance? This question must be considered and reconsidered by any executive who wants to run a successful enterprise. It's a question that's inspiring some of the most innovative, breakthrough thinking about technology and competitive strategy today. And it is the focus of the next CIO Perspectives conference.

Bringing Your Boss — In the past, many conference participants who brought their bosses have said that it was one of the most important and beneficial decisions they have ever made.

Companion Program — Companions will participate in all planned meals and entertainment. On Monday, a tour is planned of Biosphere II, a 2.5 acre glass-enclosed structure housing a tropical rain forest, desert, savannah and 35-foot deep ocean. On Tuesday, companions will visit the Arizona Sonora Desert Museum and Old Town Artisans.

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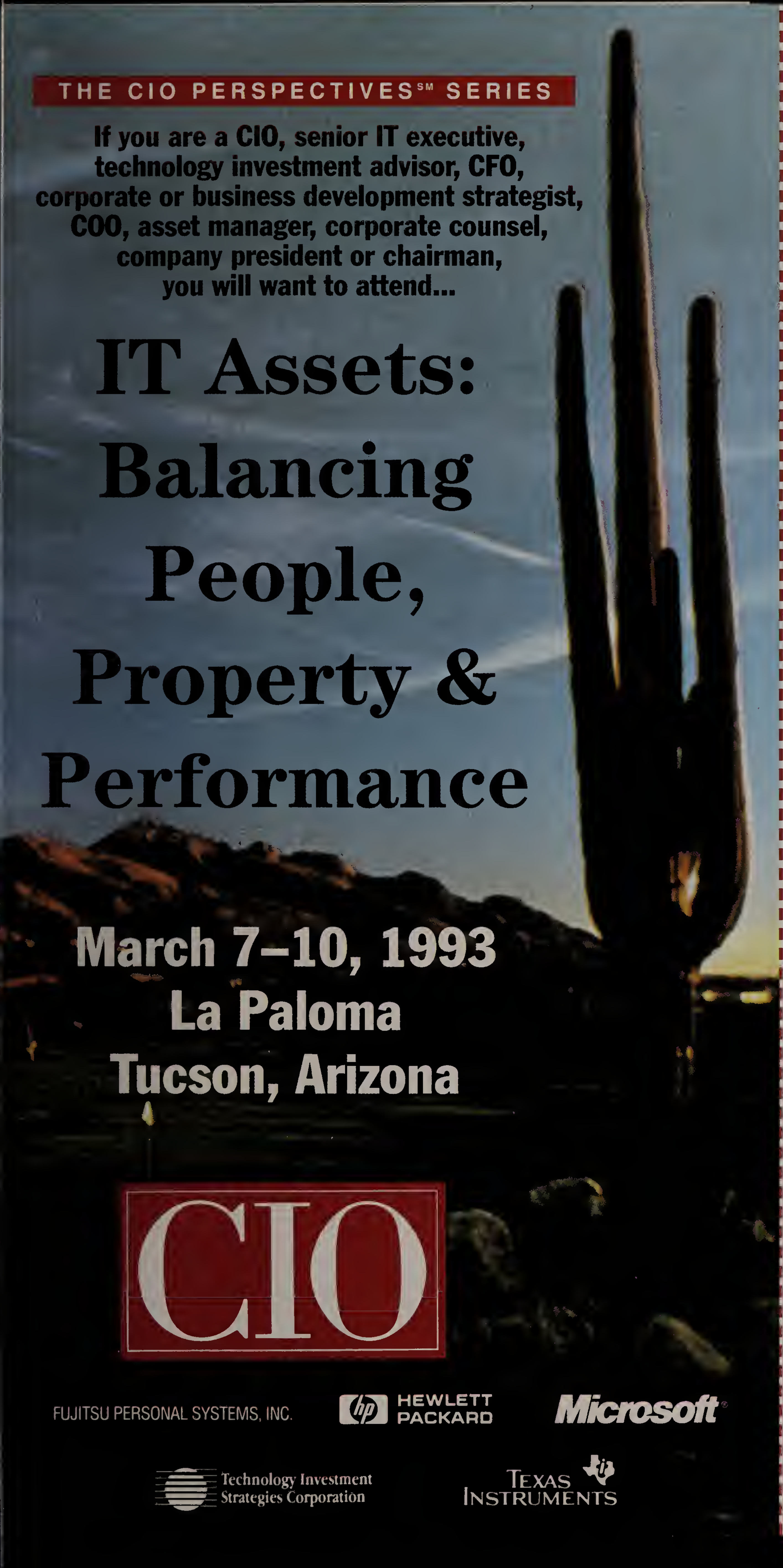

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You may cancel your enrollment up to February 26th without penalty; no refund or credit will be given for cancellations received on or after February 27th. You may send a substitute with a similar title in your place.

CIO

Ready, set, implement! **24**

COLUMNS

INSIGHTS: PREPAREDNESS TRAINING 24

Even the most promising new technologies won't fulfill their potential if the organization isn't ready for them.
By Chris Pickering

STATE OF THE ART: WHAT A CARD! 64

You can use them to replace your rolodex, purchase airline tickets or rent a car. One variation pays tolls automatically from moving vehicles; another routes products through a manufacturing line. And they're way smaller than a bread box.
By Megan Santosus

FRONTLINE: THAT WONDERFUL YEAR 68

A fond reflection on the 10 most valuable ideas of 1992, and a cautious glimpse into the future.
By Portia Isaacson

WORKING SMART: POWER TO THE PEOPLE 76

Giving users the ability to generate their own applications may seem like a rash thing to do. At Varian Associates, the practice has been a big success.
By Megan Santosus

Coming attractions **68**

Process under the palms **14**

DEPARTMENTS

Editor's Letter 8

Publisher's Letter 10

Trendlines 14
- CIO conference
- AMS awards
- Measuring IT assets
- HP user survey
- Advertising know-it-alls
- Stocking stuffers
- Online book tours
- Reflections on DEC

FYI 72

Index 73

Off the Shelf 74

Gift horsing around **14**

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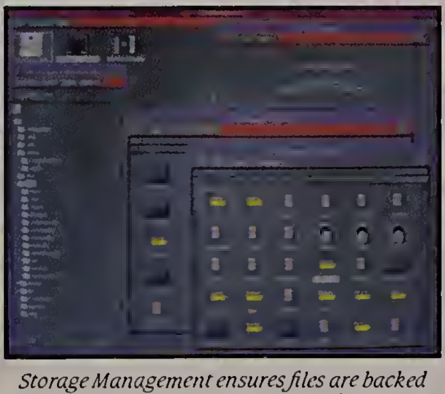

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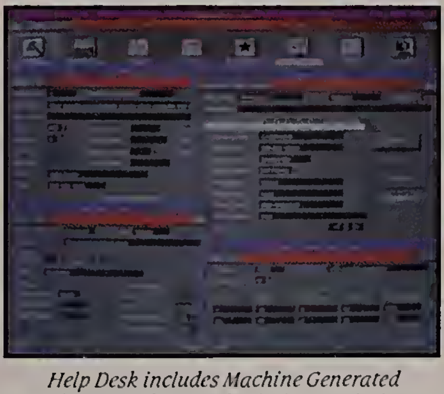

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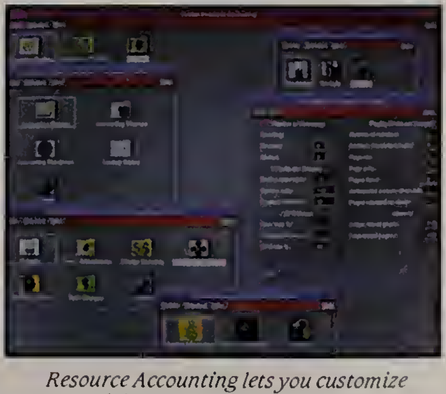

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The coming of the New Year always evokes the anticipation of change. For many of us, that prospect is stimulating—as long as the change is not too profound.

The messages conveyed by information executives and other experts at recent conferences corroborate the significance of change in today's organization. Although efforts to reengineer business processes are often justified in terms of cutting costs and enhancing competitiveness, the most visible impact of these endeavors is on human resources in the organization. Technology may be an enabler of successful business-process redesign, but its importance pales before the behavioral changes required of the workforce.

While it's true that reengineering may cause job losses, in many cases it results in reassigning employees and redefining jobs. Employees are under pressure to find ways of breaking through rather than avoiding the barricades to change. The new-age management concepts—teams, workgroups and empowerment—have become realities at many companies undergoing business-process redesign.

In his speech at our CIO Perspectives Conference in October, economist Lester Thurow observed that whereas the financial executive is the closest to the CEO in most U.S. businesses, in other countries the executive in charge of human resources is more likely to hold this pivotal position.

CIO magazine has always stressed the political aspects of information management and the need for IS executives to understand their role as change agents. That challenge has never been greater. New leadership talent is clearly necessary to bring the corporate environment into synch with the changing global economy. With their knowledge of systems and procedures, information executives are in a key position to help their organizations reengineer business processes. But like other important managers, they must learn to develop in employees the resilience they will need to adapt to change.

Hopefully CIOs will not be overwhelmed by the prospect of all this organizational flux. The *CIO* editorial team wishes our readers and their families a cheery, nonstressful holiday season and a happy and healthy New Year.

Marcia Blumenthal

PHOTO BY WEBB CHAPPELL

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LETTER FROM THE PUBLISHER

As reported in this issue of *CIO*, object technology has the potential to revolutionize today's programming techniques. From an enterprisewide standpoint, it can provide the gateway to the distributed, client/server computing which IS groups have thus far found difficult to achieve using structured programming systems.

The problem with object technology seems to be that too few IS executives truly understand what it is and what its potential benefits are. Despite a handful of "early adopter" successes, numerous organizations have yet to evaluate this new technology, let alone put it to use. In our report, which begins on Page 28, we've attempted to define object in layperson's language and demonstrate its advantages through the experiences of several organizations that are already exploiting it.

Given the tremendous potential benefits of object, I believe it's time for vendors in this arena to become more vocal and spread the gospel among CIOs and top IS executives, who clearly are in the position to embrace this technology and implement it in their organizations.

To encourage these people to abandon the familiar technologies of the past, vendors will need to promote the business benefits of object, address CIO concerns about the lack of standards and demonstrate its return on investment through actual user experiences. In this way, object technology can move more quickly from the early adopter phase into the mainstream.

P.S. We encourage you to register now for the next CIO Perspectives Conference, "IT Assets: Balancing People, Property and Performance," to be held March 7-10, 1993, at La Paloma in Tucson, Ariz. Don't be left out! Call our toll-free conference registration hot line at 800 366-0246.

PHOTO BY GEORGE SIMIAN

Coming In CIO

The Burden of Proof

Last summer *CIO* asked readers to show us how their companies confronted the challenge of demonstrating return on technology investments. From the responses, we chose six that had successfully sold the strategic benefits of new systems to senior managers and whose implementations paid off handsomely for their organizations. Their stories should help IS managers and others make the best possible case for technology.

Where Are We Now?

CIO and Coopers & Lybrand report on the state of the CIO as perceived by non-IS executives. Some longstanding trends remain strong, including the CIO's increasingly critical role in top-level decision-making and the movement of management expertise to the forefront of qualities considered critical for a CIO. But when it comes to the IS executive's role in financial and manufacturing firms, old assumptions fly out the door.

The Issue of Ethics

IS ethics are defined by concern for data usage, integrity and security; protection of personal privacy and software copyrights; and wariness of conflicts of interest and improper vendor relationships. "Information is power, and CIOs have an ethical responsibility to ensure that power is not abused," says Gary Edwards, president of the Ethics Resource Center.

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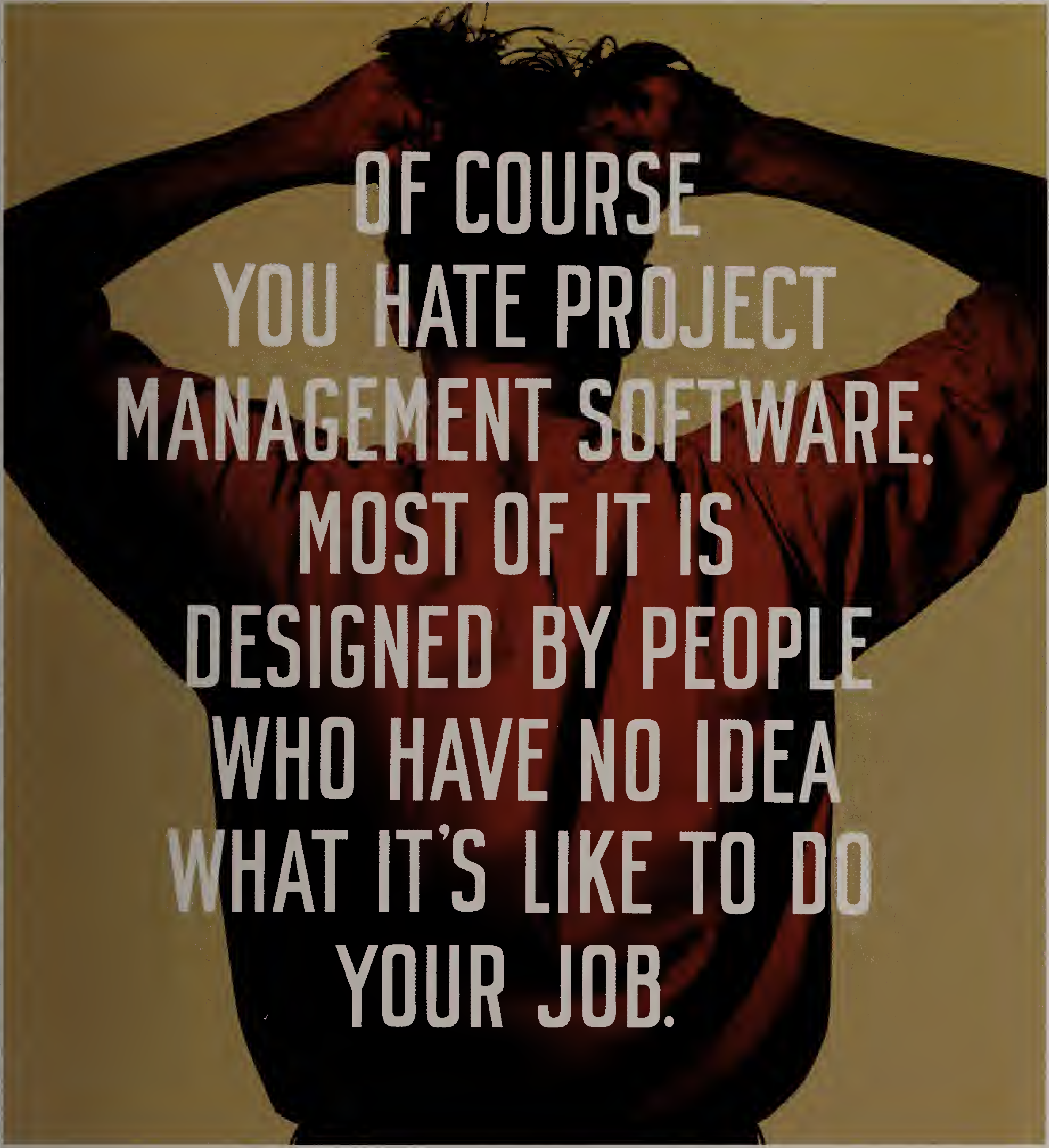

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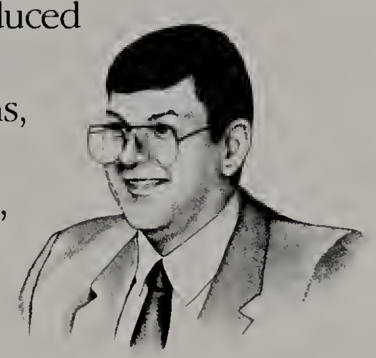

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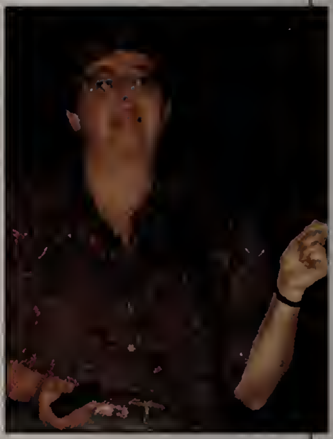

CIO's *most recent conference was held at Florida's Boca Raton Resort & Club. Reengineering veterans* **KATHLEEN TAYLOR** *(above) and* **PAUL A. STRASSMANN** *(left) were among the speakers.*

CIOs seeking opportunities to play a pivotal role in their companies' reengineering efforts found much to ponder at the most recent CIO Perspectives Conference, held Oct. 11–14 at the Boca Raton Resort & Club in Boca Raton, Fla. More than 30 speakers inspired some 600 attendees to probe the processes of IT and how to organize for success.

The program began on a sober note Monday morning, when keynote speaker Lester Thurow, dean of Massachusetts Institute of Technology's Sloan School of Management, described the challenge that U.S. firms face from global competition in the 1990s—and suggested that this country may need to reengineer the relationship between government and business.

Thurow argued that the U.S. economy is a victim both of its own success during the last 50 years and of our inability to change to remain competitive. For instance, while American technology has reshaped the world, we have not changed our national priorities to keep pace. "In the 19th century, America rode to the stars on the strength of [its] abundant natural resources and [its national policy of] compulsory education for all," he said. "But now technology has kicked natural resources out of the equation," and we have allowed our educational infrastructure to erode. The industries of the future "are technological—biotechnology, materials science and information technology among them—[and] depend upon knowledge and sophisticated skills, not natural resources." Thurow contended that "both Japan and Europe are doing more than the U.S. to harness the people resources necessary for 21st-century competition."

Thurow concluded his speech by noting that communitarian capitalism—the partnership of government and business—is the ascendant economic system in the rest of the world and may prove to be a better mousetrap than our individualistic free-market approach.

The morning of the second day was dominated by the spirit of Machiavelli, the notorious 15th-century Italian philosopher and politician. CIOs, snared in their own type of political web, would do well to heed Machiavelli's political strategy of ruthlessness, cunning and duplicity, advised Doug Nagan, president of IT services firm International Resource Management (New York) and former CIO for publisher John Wiley & Sons.

To overcome corporate resistance to change, Nagan said CIOs must be willing to employ psychological intimidation and exert force to back up softer methods of persuasion. He said it is essential to seize and maintain control of paper—the key to most corporate power structures—and he adapted Machiavelli's warning against court ministers to today's IT consultants. "Too much reliance on consultants will make you seem less qualified and competent on your own," he cautioned.

Conference attendees who arrived in Boca convinced that client/server technology isn't ready for prime-time computing may have left feeling differently, thanks to Merrill Lynch Vice President Fred Winograd. A vociferous client/server advocate, Winograd stressed that current business demands for speed and flexibility warrant serious consideration of client/server technology.

"Now is the time," he said, claiming that key components such as network software and relational-database technology have matured to the point of practicality.

When he wasn't spouting inspirational poetry or ribbing keynoter Thurow for his liberal leanings, Chris Bluemer dramatically demonstrated that outsourcing can be a winning strategy in business reengineering. Fireman's Fund of New Jersey was on the verge of abandoning the market last year before Bluemer, who was CEO and sole employee, reorganized the

PHOTO (TOP LEFT) COURTESY OF BOCA RATON RESORT & CLUB; OTHER PHOTOS BY ROBERT ERICKSON

OPEN MINDED

Listen up, Hewlett-Packard—your users have spoken. Database technology, interoperability and open systems are the top priorities for members of The International Association of Hewlett-Packard Computer Users who responded to the group's annual Strategic Concerns Survey.

Nearly 80 percent of IS manager respondents said they were satisfied with HP's movement to open systems. Concern for Unix standards climbed the highest—up 11 slots since 1991's survey—to place eighth on the priority list this year. The growing Unix concern corresponds with a 13 percent hike in respondents reporting installation of HP Unix systems.

A less rosy finding: Nearly 95 percent of respondents called "ease of ordering" their top vendor-relationship priority, but only 16 percent said HP was meeting their expectations in this area. The user group, based in Sunnyvale, Calif., claims 7,500 members in 62 countries. ■

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company. This year the Bridgewater, N.J.-based auto insurer expects to earn $40 million in revenues. Yet thanks to systems outsourcing, the firm still has only 25 employees. Without this key strategy, head count would have bloated to 200, Bluemer said.

Cigna RE Corp., the reinsurance division of Philadelphia-based Cigna Corp., has earned national praise for its successful reengineering program (see "Trendlines," *CIO*, Oct. 15, 1992). One of the architects of that effort, Senior Systems Vice President Kathleen Taylor, explained that its success hinged on motivation and leadership from the business side rather than from IS. The 18-month, $3.24 million project reengineered 85 percent of existing systems and has paid off in a $1.5 million reduction in annual operating expenses.

Paul A. Strassmann, principal deputy assistant secretary of defense for command, control, communications and intelligence, outlined the Pentagon's massive effort to restructure, reengineer and downsize (by $7 billion) the military's $20 billion IS budget. The Pentagon's plan for change, dubbed the Corporate Information Management (CIM) program, calls for a consolidation of the Defense IS infrastructure and a decentralization of IS business decisions among the services. Strassmann touched on techniques for justifying IT investments ("We CIOs have to be able to relate to financial people in their own terms") and detailed a business-process modeling standard the military has adopted for reengineering. And he dismissed the notion that reengineers must take a radical approach to shaping processes. "Business-process redesign is human, painful and something for the long haul," he told the audience.

Conference attendees were also treated to two panel discussions. One, led by DuWayne Peterson, former CIO of Merrill Lynch, looked at a new model for IS, based on the model of a power station. The second, moderated by *CIO* Editor-in-Chief Marcia Blumenthal, focused on the nitty-gritty of business-process change.

Finally, Robert Fulghum, minister, musician, ex-IBM salesman and three-time best-selling author of such works as *All I Really Needed to Know I Learned in Kindergarten*, sent attendees home puzzling over an eon-spanning perspective of what they know versus what they believe. ■

AMS AWARDS

IS Movers and Shakers

There's no doubt that the winners of this year's Awards for Achievement in Managing Information Technology, cosponsored by American Management Systems and the Graduate School of Industrial Administration of Carnegie Mellon University, are deserving. Two have appeared on the cover of *CIO* within the past six months, another has been written up twice in these pages, and the system developed by a fourth has also been mentioned.

The winners were chosen for the impact of their achievements on their organizations and on the IS profession, their vision and originality, the success with which they managed project resources, their leadership abilities and the effectiveness with which they sold their projects to senior management and worked to ensure their projects' implementation, adoption and success.

PETER L. BLOOM, managing director for business technology
Salomon Brothers Inc., New York

Between 1988 and 1991, Peter Bloom led the effort to revamp Salomon Brothers' outdated securities sales and trading platform using open-systems-based client/server technology. "We were starting to see a reduction in our ability to compete in an expanding global marketplace," said Bloom. At the same time, the company's expanding technology infrastructure was outgrowing its existing facilities.

Bloom built a multidisciplinary team from IS and line-business groups and involved key users in designing the new platform. The platform enables traders and salespeople to see side-by-side pricing from various markets as well as internal and external reports and data on individual securities. A flexible suite of applications allows requests for data as needed; the data is automatically fed into analytic programs and spreadsheets for immediate analysis.

Applications are developed and made operational in less

On The Record

Direct-mail advertisers are like a bunch of gossips; they're so pleased with what they know that they just can't bear to keep it to themselves. So says Denison Hatch, editor and publisher of *Who's Mailing What!*, according to the September 1992 issue of *FOLIO:* magazine. Despite consumer sensitivity about privacy issues, says Hatch, direct mailers continue to trumpet the fact that they know more about their target audiences than the targets themselves might like. Hatch cites the hypothetical example of a travel magazine soliciting consumers on a list rented from Air France. People receiving a letter beginning, "We know you travel to France frequently," might feel a bit intruded upon, suggests Hatch, who sees 4,000 to 5,000 direct-mail pieces a month (lucky him).

Hatch's prescription is to "dumb down" promotion copy. "It's not a matter of whether the information used does, in fact, constitute invasion of privacy," Hatch contends; "it's the *perception* of invasion of privacy you have to guard against." An interesting point, but one to which consumers might take exception. If they ever caught on.

Hatch also recommends tweaking the terminology. Instead of "database" and "target," let's talk about "extended-family" and "intimate" marketing, he proposes, suggesting that this might somehow make marketers more sensitive. Now there's a concept. ■

ILLUSTRATION BY FRAN O'NEILL, PHOTO COURTESY OF AMS

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TRENDLINES

than half the time and at much lower cost than previously. The company's technology budget declined 10 percent from 1991 to '92 and will drop again this year.

BERNARD W. GLEASON, executive director of information technology
Boston College, Chestnut Hill, Mass.

In the mid-1980s, Bernard Gleason led the strategic planning process to reorganize computing and communications at Boston College. This effort has integrated "not only computing and communications," said Gleason, "but also all the services we provide..., eliminating the redundancy that still exists at many institutions."

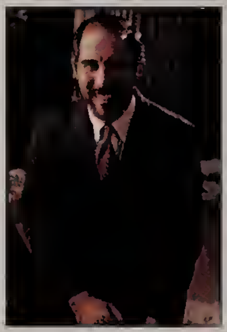
Gleason's goal was to link all of the university's systems and provide students, faculty and employees with a single interface from virtually anywhere on campus. Users can conduct business through computers, telephones and ATMs, which were added in 1988 so students could make cash withdrawals, query the status of their accounts (which provide billing for dining, long-distance telephone and other services) and look up their grades.

In 1984, Gleason initiated BC's participation as an original member of the Apple University Consortium. In 1990, he helped to plan and design a fully functional multimedia teaching laboratory.

CRAIG D. GOLDMAN, CIO
Chase Manhattan Bank NA, New York

In 1988, as senior executive for operations and systems of North America corporate finance at Chase Manhattan, Craig Goldman developed a global network of PCs to put critical information directly on bankers' desks. Carrying all of the company's internal data and using NewsEDGE to search and retrieve external information from over 100 sources, the network "allows employees to keep abreast of market events and opportunities..., risk exposures, customer needs" and other critical information, Goldman explained. Users set the search criteria individually, and the system alerts them when it finds something. Another system helps "identify companies that are candidates for various products we sell."

ROBERT D. LYNCH, vice president and director of Primis
McGraw-Hill Inc., New York



Robert Lynch conceived of the Primis custom-publishing system in 1989 as sponsoring editor of accounting in McGraw-Hill's college division (see "Trendlines," *CIO*, December 1989; and "IT and the Powers that Be," *CIO*, July 1992). He oversaw the system's development, marketing, and editing and production functions and worked with Eastman Kodak and R.R. Donnelley to develop the technology and production facilities.

Primis's first offering was in accounting; today it covers 14 academic disciplines. Not only does Primis enable educators to tailor-make texts and workbooks for specific courses, but it provides McGraw-Hill with "just-in-time manufacturing," said Lynch; "there is no warehousing, no inventory, no out-of-stock or out-of-print."

A boon for educators, Primis texts are currently used in more than 350 colleges and universities.

BOBBY L. MARTIN, executive vice president of IS
Wal-Mart Stores Inc., Bentonville, Ark.

In the mid-1980s, then Director of MIS Bobby Martin drove a major reengineering of Wal-Mart's information systems. The effort linked stores, distribution facilities and suppliers to shorten the time between point of manufacture and point of sale.

Wal-Mart's satellite network provides real-time updates of sales and inventory information and interconnects the home office and all stores and distribution centers (see "Retailing in Real Time," *CIO*, August 1992). Wal-Mart now issues purchase orders to and receives invoices from vendors electronically, and vendors can access point-of-sale, forecasting and inventory-management information in real time by store, district, region or entire chain.

These systems have enabled Wal-Mart to significantly reduce inventory and increase inventory turns and to improve customer service and return on investment, according to the company.

Three individuals received honorable mentions:

SHIRLEY F. AXTELL, director of the crisis coordination center at the Office of the Secretary of Defense—for creating and directing the center, which continuously monitors information about the world situation, improving crisis decision-making and reducing reaction time from days to hours.

HANS J. FRITZ, chief information systems executive for Allianz Insurance Corp. in Munich—for upgrading the archaic, backlogged information systems of the former East German state-owned insurance company acquired by his firm after unification. In six months he extended applications support to East German offices, built new data and production printing centers, cleared the data-entry backlog and modernized communications.

JESUS A. RODRIGUEZ, director of information technologies for the Tucson (Ariz.) Unified School District—for developing a distributed-processing environment and moving decision-making from the central district out to school principals. ■

OFF THE RECORD

As Digital Equipment Corp., of Maynard, Mass., struggles with its financial and organizational woes, pundits aplenty—especially in the press—think they know what DEC did wrong. Sales. Marketing. Open systems. Matrix decision-making. Ken Olsen. Take your pick. But a consultant close to the company offers this further intriguing perspective:

"DEC's management has been navel-gazing," he said. Caught up in the heady push to create a learning organization, to promote empowerment and to design the corporation for competitiveness, DEC managers may have forgotten the simple, essential reason for going to work in the morning. "They got caught up in the process of managing and in management-related issues, and forgot about the customer," the consultant continued. "They let their attention drift away from the business." And in this, no doubt, DEC isn't alone. ■

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TRENDLINES

MEASURING I.T. ASSETS

GO WITH THE (CASH) FLOW

How liquid are your IT assets? The Yankee Group, a research and consulting firm based in Boston, says that CIOs seeking a better understanding of the value of IT investments should measure their technology's capability to enhance the liquidity of the firm.

From the balance-sheet perspective, Yankee argues, companies increase their value over time by efficiently liquefying assets—or converting them to cash. Inventory becomes product; the trick is to increase margins and the volume of sales. Margins times volume equals value.

Traditionally, IT investments were justified by their ability to improve production or lower costs. That covered margins, but what about volume? The Yankee Group believes that the long-term value of IT assets lies in their ability to speed up the processes that govern the liquidation of assets within an organization—both to streamline operations and to stimulate demand for goods and services.

For instance, at some companies technology may enhance liquidity by improving customer sales/service data for a direct-marketing campaign, reducing time to market for products, or providing quicker response to customer requests. Such systems may not be adequately valued using traditional IT justification measures.

To determine how IT assets increase (or decrease) liquidity, CIOs should begin by mapping technology's contribution to the organization, using the value-chain methodology pioneered by Michael Porter. This will provide managers with the broad, conceptual framework upon which to hang more detailed measurement schemes.

Priorities in hand, CIOs should use an economic model to scrutinize the assets and expenses required for any potential activity and identify ways that IT can add value. Then they should propose initiatives, define appropriate measurements, implement the system and evaluate the project.

Of course, there is another way to make assets liquid—sell them. IT assets that do not increase the value of the firm should be sold or outsourced, Yankee advises. ▬

SCRIBES ONLINE

Pity the poor reclusive author, forced to leave the sanctuary of creative solitude and strut his or her stuff like Madonna on endless talk shows and promotional tours. Even those six-figure royalty checks hardly seem adequate compensation.

Author Bruce Sterling is getting around all that by using some of the same tools as the subjects of his most recent book, *The Hacker Crackdown*. According to *The New York Times*, Sterling is embarking on a "global computer-network tour" and will appear "live" on a number of networks, including CompuServe and Genie.

Subscribers to the networks will be notified in advance of when Sterling is coming online, and will be allowed to ask him questions over the network ("If you were a tree. . ."). A systems operator will moderate the event, and excerpts from his book will be made available through the systems.

Writers such as Tom Clancy and Michael Crichton have also used this format, and more and more authors have been considering going online rather than on the road. "I look at it as hanging out and typing with people," Sterling told the *Times*. "I've been calling it the 'virtual tour.' " ▬

SLEIGH BELLS AND WHISTLES

You're having second thoughts about giving your favorite systems analyst yet another pair of those fingerless Isotoner "programming" gloves. Well, you're in luck. Here is our Second Annual Smorgasbord of Seasonal Stocking Stuffers. So, get out those electrostatic pencils and debit cards. . . .

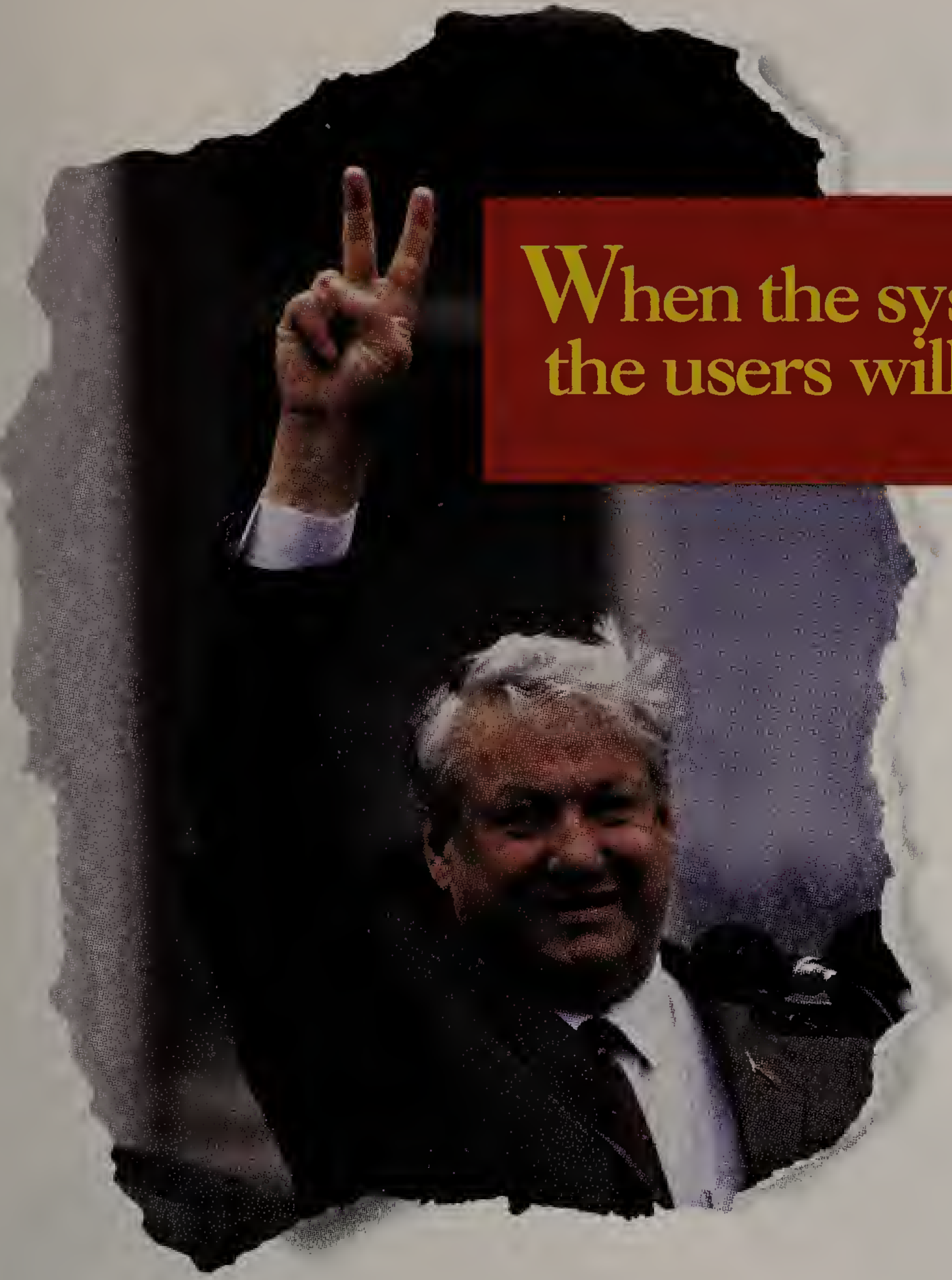
▶ CONQUER RISK AVERSION! If you feel like the deck is stacked against you, maybe what you really need is to understand the deck a little better. SoftLogic Solutions, of Manchester, N.H. (800 272-9900), offers Blackjack Master, a $29.90 program that teaches "winning concepts" to help novice blackjack players "play like the pros" and beat the house. Play simulations "help you get smart fast." Hit me!

▶ MUSTER STRATEGIC SKILLS! "Can you change the flow of history?" asks Ninga Software Corp. (800 265-5555), of Calgary, Alberta (makers of The Wedding Planner). Take command of an army or two in Ninga's Civil War game ($59.95) and see whether you can outthink Lee and Grant. Especially useful will be controls that allow you to "decrease your foe's intelligence, ego and experience."

▶ AFFIX BETTER LABELS! Banish those curling, easy-to-lose floppy-disk labels forever. Merritt Computer Products Inc. (214 339-0753), of Dallas (don't they think big in the Lone Star State?), has what it calls the "first truly intelligent labeling system" for floppies. A plastic label caddy attaches to your floppy with a space-age adhesive and holds removable labels that can be easily changed as disk contents change. Supports both 3.5- and 5.25-inch disks. Ideal for that hard-to-please end user!

▶ STAY DRY! PART II. Nothing worse than a wet computer. Clemtech (414 425-4051), a Franklin, Wis.-based maker of water-detection equipment, is our second annual holiday season wet blanket. Their "OSHA yellow" alarm (the WS-100, $79) goes off like a banshee when its sensitive probes are leaked upon. Then you rush in to spray a coating of rust-resisting Cosmolene on the AS/400. No problemo! ▬

ILLUSTRATION BY FRAN O'NEILL



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Even the most promising new technologies won't fulfill their potential if the organization isn't ready for them

BY CHRIS PICKERING

Introducing a new technology into an organization is like performing a heart transplant: If the body isn't properly prepared to accept the new organ, it's not going to work. Too often technology deployment efforts are monolithic and short-lived. The company buys a technology, installs it and just assumes it will take off by itself. But this assumption is based on a false precept—the idea of the homogeneous target audience. When it comes to absorbing change, not all parts of the organization are equally porous.

Contrary to popular belief, a technology's virtuosity does not guarantee its success. A recent study by Systems Development Inc. (SDI), a consultancy based in Overland Park, Kan., looked at 12 advanced information technologies to determine how widely they are being used among Fortune 1000 companies and the reasons for their acceptance, or lack of acceptance, in both the technology user and non-user communities. The study revealed that while many organizations invest in technologies such as CASE, fourth-generation languages and relational database management systems (RDMSs), very few use them extensively, even when they are deemed to offer considerable advantages over existing practices.

Common sense says that organizations attempting to deploy a new technology should be using that technology wherever it is valuable, yet companies are still failing to get the greatest return on their technology investment. While it is difficult to think of a project that could not take advantage of an RDMS, for example, the SDI study showed that users of that technology employed it on only 39.3 percent of their projects. And while RDMSs have an excellent record for improving productivity and quality, 15 percent of the sample were not using them at all, primarily because of a lack of organizational readiness.

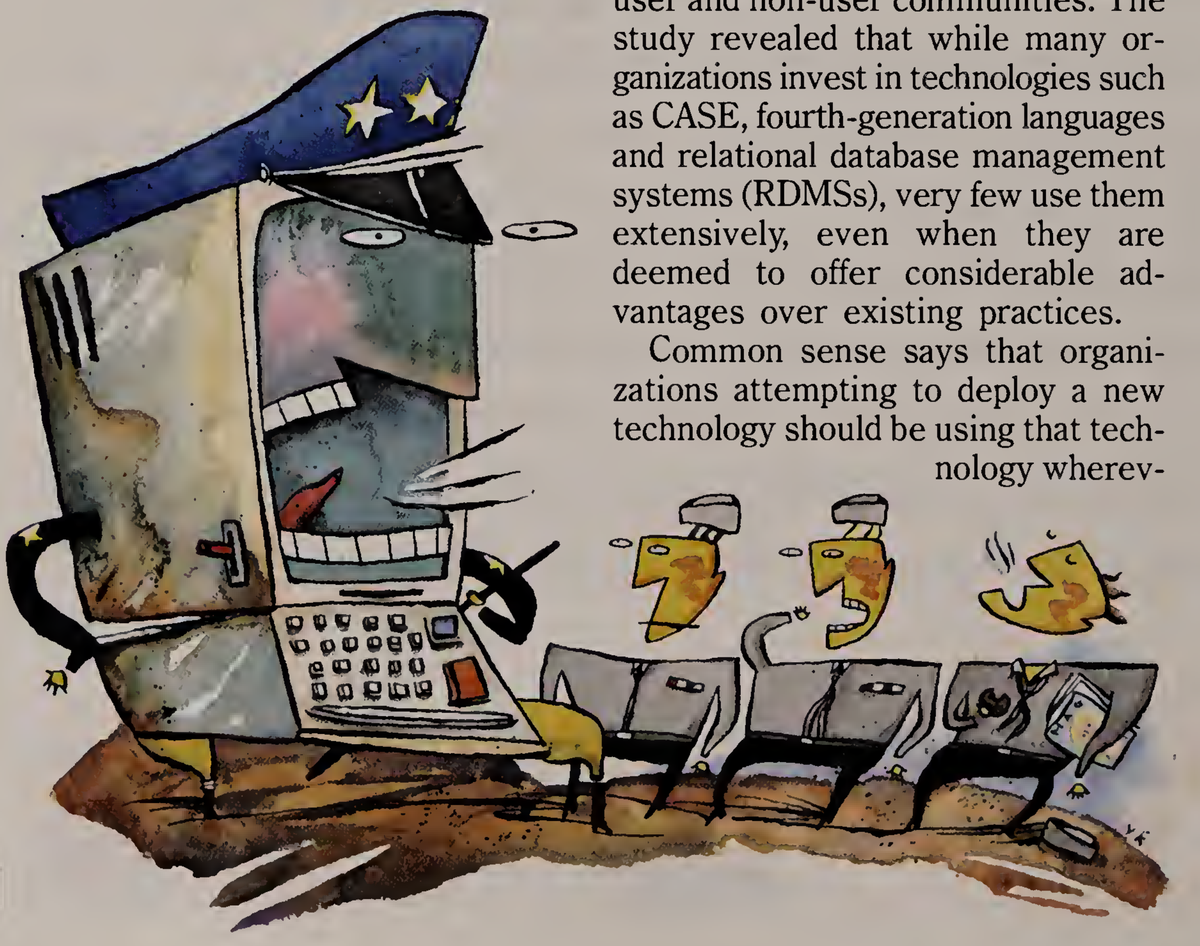

ILLUSTRATION BY VALA KONDO

This lack of readiness is one of the prime reasons so many implementation efforts fail. To be successful, a technology deployment must aggressively target everyone—developers and users alike—who will be affected by it. In many cases this will mean organizational or cultural change. Yet 75 percent of respondents to the SDI study characterized the rate of change in their IS environments as moderate, conservative or extremely conservative. And "organization unprepared" appeared among the top three reasons for not using 10 of the 12 technologies studied.

The best-known model of the spread of new ideas and technologies is Everett Rogers' "innovation diffusion theory" (described in his book *Diffusion of Innovations*), which identifies five characteristics of innovations that affect how readily they are accepted across a population. These characteristics are:

Relative Advantage: The degree to which an innovation is perceived as better than the idea it supersedes.

Compatibility: The degree to which an innovation is perceived as being consistent with the existing values, past experiences and needs of potential adopters.

Complexity: The degree to which an innovation is perceived as diffi-

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cult to understand, learn and use.

Trialability: The degree to which an innovation may be experimented with on a trial basis.

Observability: The degree to which the results of an innovation are visible to others.

Rogers' approach emphasizes the role that opinions play in the adoption process. The way people perceive an innovation frequently matters more than its objective merits. In a perfect world, any technology with a significant bottom-line impact would satisfy all employees on all of the above criteria. But corporations are heterogeneous creatures, and managers must cope with a wide range of reactions to change.

Typically, when an organization brings in a technology, the first projects are staffed by the pioneers—employees enthusiastic about innovation and anxious to make optimal use of a new solution. Because their primary concern is relative advantage, pioneers make excellent gatekeepers: They can look into a technology to see whether their organization can take advantage of it. Such people respond primarily to external sources of information. Toward that end, they should be encouraged to do what they enjoy doing: reading the trade press and attending conferences, trade shows and industry-association meetings. Because pioneers are also influenced by trialability, organizations should establish workstations dedicated to experimental technologies.

> *The way people perceive an innovation frequently matters more than that innovation's objective merits.*

Unfortunately, once the pioneers determine that a technology has value, they often want to move on to the next new thing. So it's a good idea to get the early adopters involved as soon as possible. Early adopters can take a technology determined to have value by the pioneers and begin finding real uses for it in the organization. They too are very concerned with relative advantage: If they think there's a benefit to using a particular technology, they'll do it, even if it takes considerable effort.

Even when a technology takes off with these two highly receptive groups, the implementation can falter or fail outright if little effort is made to translate their successes into a marketing program for the rest of the organization. The company must identify opinion leaders—pioneers and early adopters to whom staff members instinctively turn for advice on new ideas—and deploy them to champion the new technology and ease its way down the acceptance curve.

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The farther down they are positioned on the diffusion scale, the more concerned people are with compatibility, complexity and observability. The early and late majorities (about two-thirds of the worker population) are usually a little suspicious of leading-edge technology and respond best to word of mouth. The organization should provide them with numerous opportunities for informal discussion with peers who are using the technologies successfully.

Every organization has its laggards—people who are resistant to change in any form. Typically these diehards make up about 16 percent of an organization, and while most will eventually adopt simply to get along, managers may find themselves in a position where they must offer an ultimatum: Make the switch to this new development environment or take another job in the company.

It is important to remember that deploying a new technology is not a short-term fix. Conceivably it could take five to seven years to get everybody up to speed. Some companies will kick off a new technology with considerable hoopla and then push it to the back burner; this can be disastrous. Visibility is essential to acceptance.

Throughout the process, managers must convince all employees that they are committed to the change and constantly communicate the objectives and expected benefits of the implementation. This can be accomplished in various ways, including internal newsletters, oral technology briefings, technology fairs and the publicizing of successful implementations at other companies. Effective use of advanced technology groups and information centers set up to help end users will also help speed diffusion.

Of course, lack of organizational readiness is not the only reason technologies fail to achieve maximum penetration. Not every technology is right for every situation. There may be incompatible legacy systems, a belief that no real business need exists, or concern that the implementation would be too costly.

But when an innovation is deemed to provide significant benefits and can be implemented without severe technological contortions, it deserves an environment in which it can show itself to maximum advantage. Any organization considering an extensive new implementation must begin with a rigorous self-assessment of its current practices and readiness for change, followed by strategic deployment of opinion leaders, aggressive marketing and extensive training. While not every technology is going to achieve 100 percent penetration in every company, following this strategy will help close the unprofitable gap between choosing and using.

Chris Pickering is president of Systems Development Inc.

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THE OBJECT OF THEIR

Object technology, according to one proponent, arose out of a computer scientist's fascination with Tinkertoys—those round wooden blocks, simple and complete in themselves, that can be fitted together with sticks to create complex structures.

In object-oriented programming, systems are built much the same way. Each object represents a real-life thing, like an employee or an insurance policy, and can be used repeatedly as a building block to create other programs without extra coding to make the objects work together. Proponents of object technology expect major reductions in systems-development life cycles and the cost and complexity of maintenance, as well as greater IS responsiveness to business needs.

STORYLINE

When it comes to development tools, CASE has a much higher visibility and penetration than object programming, which many view, incorrectly, as a subset of the more venerable technology. But the few intrepid souls who are experimenting with object expect this relatively untested tool to produce dramatic improvements in efficiency and productivity. Object-oriented programming has already fueled the success of systems at Brooklyn Union Gas and Texas Instruments' semiconductor business. Proponents believe that once problems of standards and compatability are ironed out, the technology has the potential to transform business.

Unlike Tinkertoys, however, object technology has taken a while to catch on. It challenges conventional ideas of programming, and IS departments are hesitant to adopt a relatively untested concept wholesale. And like every emerging technology, object is rife with unresolved issues concerning standards, integration with legacy systems, its limitations as a business tool and its potential effect on the IS culture.

BY MEGHAN O'LEARY

To date, there are more proponents of object-oriented programming than actual users, and most of the users are high-tech companies and software developers that are basing new products on the technology. A recent study of Fortune 1000 companies by Systems Development Inc., a consultancy in Overland Park, Kan., found that only 15 percent are using object technology, and that they are using it on only 3.8 percent of their projects.

Michael G. West, program director of Application Development and Management

ILLUSTRATION BY BETHANY GULLY

AFFECTION

Strategies for the Gartner Group in Stamford, Conn., believes that the early adopters of object technology will be what he calls "A-type companies"—banks, Wall Street firms, insurance companies—which look for competitive advantage by minutes or seconds and which cannot exist without fast-moving, state-of-the-art technology. The second wave will be companies seeking cost gains and direct payback rather than competitive and strategic advantage, he predicted.

Object Obstacles

One of the main objections to object is the major changes it will require in how developers think

For many corporations, making the shift to object technology will be a cross between a baptism and a bungee jump. The biggest obstacle the technology faces in the corporate environment is a human one. "It's a leap of faith for a lot of people," said Chris Stone, president and CEO of The Object Management Group in Framingham, Mass. "You can't just be a programmer anymore."

Indeed, John E. Davis, senior partner in the Advanced Systems Group at Andersen Consulting in New York, believes that the most difficult personnel change will be the creation of what he calls "business application architects," good abstract thinkers who will combine a rich knowledge of their business with the ability to construct an application design that reflects the structure of that business. While class constructors and object assemblers will be culled from the programmer levels, these architects will most likely be departmental IS people.

Learning to think in terms of objects may take some time, however, as developers learn to incorporate them into traditional systems. "When you first move to object-oriented programming, you view objects as these sort of special things that you use with great care, and you only use them when you really need them," said Jason D. Browning, a member of the technical staff in AT&T Bell Laboratories' CAD layout and architecture group in Holmdel, N.J. "It takes close to a year to make the shift to it being a default mode."

In addition, class construction, or the building of objects, is a complex business. Every object can have hundreds of relationships with other objects, and its creation requires strong analysis and design skills. Object proponents have high hopes for an imminent object-oriented Cobol extension that will make the technology available in an environment familiar to mainframe programmers.

CIOs and their managers must also struggle with cynicism in reaction to yet another silver-bullet technology. "Many organizations have invested heavily in major technology transfers in the past 10 years," said Michael G. West, program director of Application Development and Management Strategies for the Gartner Group. "All have promised big paybacks, and all have demanded expensive investment in software, hardware, training and consulting. [Businesspeople] are shell-shocked from the others. AI, CASE, information engineering, PC development—and none [of those] have reached their potential." And while West believes that objects inevitably will take hold and transform business, he sympathizes with those who must put promises aside long enough to make real-life decisions involving money and their jobs.

–M. O'Leary

Object technology is sometimes thought of as a subset of computer-aided software engineering (CASE) because the two share the characteristic of reusable programming modules (see related story, Page 32). But while CASE is a semi-automated form of structured programming in which each function is broken down into sets of instructions, object-oriented programming is based on modeling the physical aspects of the business rather than the procedures themselves. Objects contain programming and data so the object knows what it is and how it behaves. While a CASE module could be reused in a similar application with a little extra coding, a well-designed object could be used in any application, regardless of its type.

Object modularity also means that a designer need only make changes to a single object in order to modify a program, rather than having to modify hundreds or thousands of lines of code, because one change causes a chain reaction. Such modularity was a primary reason why object's best-known business user, Brooklyn Union Gas, chose to go with object-oriented programming on the mainframe. Brooklyn Union's customer-management system was designed to be easily adaptable and maintainable while handling the complexity of the utility's customer billing, service and reporting systems. (For a more detailed description, see "Brooklyn Gas's Main Event," *CIO*, Oct. 1, 1991.)

John J. Alexander, senior vice president and CIO at Unum Life Insurance Co. of America in Portland, Maine, believes that object technology will allow his company to be more responsive to customer requests for consolidated policy billing and to make systems changes in sync with constantly changing insurance rates and regulations. His staff is currently building a pilot project to test that theory.

Chris Stone, president and CEO of the Object Management Group, a consortium of vendors and users of object-oriented tools and technology based in Framingham, Mass., believes that the reusability of objects will reduce system maintenance costs to 30 or 40 percent of an organization's IS budget. Those costs are currently as much as 70 or 80 percent at some companies.

Another characteristic of object technology that Alexander finds promising is inheritance. Inheritance is like trickle-down economics, except that it works. It means that when a programmer makes a change to one class of object, say an insurance policy, every subclass within that class is automatically changed accordingly. So in order to make a change in an insurance rate or regulation that will affect many different types of policies, a programmer need only make the change to the one policy object upon which all the others are based.

From an enterprisewide view, object technology promises to be the gateway to the distributed, client/server computing that information systems groups have been hard pressed to realize using structured programming systems. Objects have a characteristic called dynamic binding that allows programmers to design distributed applications without specifying ahead of time which systems will be communicating with which for any given application. Dynamic binding allows the system to decide which objects on which servers to access at the time of the request.

At Texas Instruments in Dallas, dynamic binding was a key enabler of the semiconductor group's computer-integrated-manufacturing system which the company developed with the Air Force and DARPA. The goal of the program was to make manufacturing semiconductors for "smart weapons" competitive in the United States by drastically improving speed and reducing costs. The new process had to be very responsive to changes on the manufacturing floor, and programming changes needed to be made easily.

One interesting part of the decision-making process: TI naturally considered its own Information Engineering Facility development tool first but determined that the changes it was trying to effect in the manufacturing process would have to be revolutionary. IEF offered only evolution, according to TI's Manager of Product Marketing Bob Dorn. Dorn estimates that the company's capital costs in semiconductor manufacturing would have risen from $150 million to $1.5 billion, and the number of personnel required from 75 to 1,000 without the drastic improvements in efficiency and productivity he expects from the new system. With those improvements, he expects TI's numbers to remain about the same as they are now. Object-oriented systems are particularly well-suited to a manufacturing environment because they offer GUIs that reduce the need for training, simplify the interaction between the manufacturing worker and the system, and often eliminate the need for manuals, he said.

In addition, object technology should allow users to access data without knowing what kind or where it is or how to get at it, according to Joe Cordo, director of marketing for HyperDesk Corp. in Westboro, Mass., which makes a distributed object-management system. HyperDesk is based on the Object Request Broker (ORB), an emerging industry standard that handles the communication between users and objects, selecting the best available object to satisfy a request in a distributed environment. ORB provides a common interface for objects, allowing them to communicate transparently. It also allows users to get the right data easily without even knowing it is out there. The bigger-picture benefit is that organizations will be able to integrate data and applications more easily by treating them as objects.

Object-oriented systems are particularly well-suited to a manufacturing environment because they offer GUIs that reduce the need for training, simplify the interaction between workers and the system, and often eliminate the need for manuals.

In a manufacturing environment, for example, a change to an object in the engineering stages would automatically be made to the design data as well. AT&T Bell Labs in Holmdel, N.J., uses an object-oriented CAD circuit-board data editor that translates CAD data into objects to do this very thing. Each object in the system represents a component on a circuit board. When an engineer wants to make a change to a board design, he or she merely changes the definition of an object or replaces it with a new object. The changed object knows how to interact with the rest of the objects. The data editor translates the objects back into manufacturing data and saves the engineer the effort of having to go into the CAD data and change hundreds or thousands of components to accommodate the new one. This ability would make concurrent engineering a reality for many organizations without the cost and time investment associated with writing remote procedure calls for every application.

Additional Reading

Object-Oriented Technology: A Manager's Guide
By David A. Taylor; Servio Corp., Alameda, Calif, 1990.

Object-Oriented Information Systems: Planning and Implementation
By David A. Taylor; John Wiley & Sons Inc., New York, 1992

Object-Oriented Software
By Ann L.Winblad, Samuel D. Edwards and David R. King; Addison-Wesley Publishing Company Inc., Reading, Mass., 1990

Not Just Another Pretty CASE

They both employ reusable programming modules, but there are important differences between object technology and CASE

When people hear about object technology and how it will allow programmers to build systems in a matter of hours by plunking objects together, they invariably start thinking that the technology is computer-aided software engineering, or CASE. And although some people will try to convince you that object programming is a subset of CASE, it's not. Although it could be.

CASE does allow programmers to build systems quickly, using graphical representations of functions that the CASE tool then translates into code. But the graphical representations CASE users are bringing together are not objects. Indeed, the code underlying the pictures is created according to structured programming techniques that are anathema to object-oriented programming.

Today, object-oriented programming is primarily available in the form of object-oriented languages such as SmallTalk and C++. Another breed of products, including Borland International's Object Vision and IBM's OS/2 System Object Model, gives the programmer a graphical user interface on top of an object-oriented programming language. But this is still a wood-burning development environment compared to what CASE tools make possible with structured code.

Object-programming proponents are still waiting for tools that will automatically design objects, and in all likelihood, many objects will be designed by vendors and sold ready-made to users. CASE for object-oriented programming, according to Chris Stone, president of the Object Management Group in Framingham, Mass., will come in the form of systems that allow programmers to recreate the complex structures and machinations of their organizations in the form of systems based on these primarily ready-made objects.

–M. O'Leary

Unlike many emerging technologies, object offers a way to address old programming structures while taking advantage of the new. This feature is called wrapping, and it allows a programmer to take an application written in Cobol, for example, define it as an object, and create an object-oriented method of accessing it. Another approach is to break the application down into components, define them as objects, and create object-oriented communication among them. This technique allows organizations to reuse the functions of older systems. It also allows them to bring systems into the object arena function by function rather than having to take down a whole system at a time.

Despite its promise for integrating diverse systems, object technology suffers from a lack of standards, especially in terms of defining classes of objects. It is generally agreed that certain classes of business objects, such as general ledgers and purchase orders, will ultimately become as standardized as clip art. They will be bought off the shelf or designed as corporate commodities and used interchangeably in numerous programs. But in order for this to happen, designers must define classes of objects so that they are universally applicable and reusable. Vendors are beginning to offer libraries of common and highly specialized objects, but even libraries written in the same object-oriented language won't necessarily work together if the objects within them are written according to different design standards. Like Eli Whitney's industrialized gun-making, object-oriented technology relies on the sameness of parts.

From an enterprisewide view, object technology promises to be the gateway to the distributed, client/server computing that IS has been hard pressed to realize using structured programming systems.

Another stumbling block is the incompatibility of different object-oriented programming languages. Smalltalk, developed at Xerox PARC in Palo Alto, Calif., is generally considered to be a pure object-oriented language because it was designed as one from the outset. The most popular object language, C++, is really a structured programming language with object extensions. It will do all the things object-oriented languages do, but it requires a lot more programming work to make it do them.

Members of the Object Management Group are moving aggressively to promote the adoption of standards and interchangeability of objects and classes. Still, Stone believes he and his cohorts will have to wait another five to seven years for consensus on such standards to reach a point where users no longer have to worry about them when they enter the object realm.

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INTERNATIONAL AFFAIRS

BY ALLAN E. ALTER

The CIOs of companies venturing into foreign markets quickly realize that a global network and state-of-the-art information systems will take them only so far. Cultural constraints—and the sheer difference in scale of most markets compared to the United States—often call for a new technology approach.

BECOMING an international competitor means more than hooking up a global network. According to executives at companies that have recently opened overseas stores, factories or sales offices, IS executives need to think hard about what technology can and cannot do for their organizations when they first expand overseas, and where to invest their energies. It's not such a small world after all, and technology alone can't bridge it.

Newcomers to foreign shores find they may have to shelve their time-tested North American IT strategies or let some of their snazzier technical capabilities lie fallow for reasons that have nothing to do with technology. "American companies think foreign markets are a way to leverage knowledge, products and economies of scale. Instead, they find they have to fracture their efforts," said Robert H. Hayes, a professor at the Harvard Business School specializing in international industrial competitiveness. That's been the experience at Toys 'R' Us, the toy and children's clothing retailer based in Paramus, N.J.

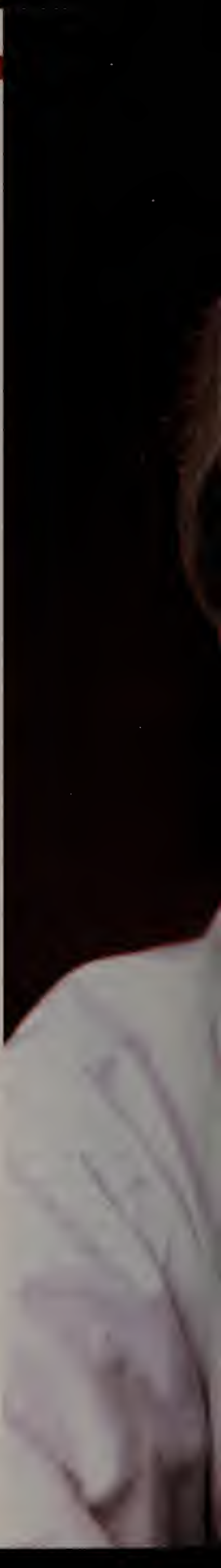


PHOTO BY KENT HANSON

DENNIS HEALEY: *Toys 'R' Us creates separate national business units for each country it enters. Simply exporting its U.S. systems overseas would be overkill.*

Thanks to President Bush's appearance at its first Japanese store early this year, Toys 'R' Us has become a symbol of new American global competition. After blowing away American rivals Child World and Lionel, in no small part because of its IT prowess, Toys 'R' Us is surging across Europe and the Pacific Rim. But Dennis Healey, vice president of MIS, had to rethink his entire IT strategy when his company went abroad.

According to Healey, Toys 'R' Us's retail systems were built to support a high-volume, low-price business. They were also built for a large market like the United States. But for reasons having nothing to do with technology—and everything to do with freeing local management to focus on national markets, local regulations and local distributors—Toys 'R' Us decided the best way to begin its overseas expansion was to organize itself into separate national business units. Each unit, of course, is far smaller than the one that serves the U.S. market. Healey realized that simply exporting his American systems overseas would be overkill.

"In the U.S., our systems service many stores and distribution centers, but in Europe, it's like starting anew," Healey said. "Here in the U.S., so much is done with efficiencies of scale. It might take 100 stores to justify a system or certain technologies. And a lot of our U.S. Toys 'R' Us systems wouldn't work [abroad] because they would need multiple sources of data" that are not available there.

So Healey has chosen a different IS strategy to help initiate Toys 'R' Us's overseas expansion: Instead of carrying over his centralized legacy systems, Toys 'R' Us's systems in Europe and Asia are stripped down, simplified and localized. The company's American infrastructure consists of Unisys mainframes to house the corporate data, DEC VAXes in the stores and NCR point-of-sale terminals. But in Europe, Toys 'R' Us relies strictly on IBM AS/400s and POS systems.

SWEDES GENERALLY LIKE TO SIT ON HARD SOFAS AND LIE ON SOFT BEDS; AMERICANS LIKE TO SIT ON SOFT SOFAS AND SLEEP ON FIRM BEDS.

GEOFF COOPER *(left) and* **FRANK LAHUE:** *Reining in IT in deference to Japanese preferences.*

PHOTO BY BILL FARRELL

While basic administrative and human-resource applications are developed in-house for the company's U.S. operations, foreign branches purchase theirs from local vendors tuned to local requirements. And many applications simply aren't recreated at all. For example, Toys 'R' Us doesn't run in Europe the kind of purchasing and logistics systems it uses in the United States because it's easier at this stage to rely on manual clerical processes. Other applications aren't duplicated for regulatory reasons. Spread-spectrum radio technology, for example, used to link mobile workers and their handheld terminals to the store computers at home, is not allowed in Europe, according to Healey.

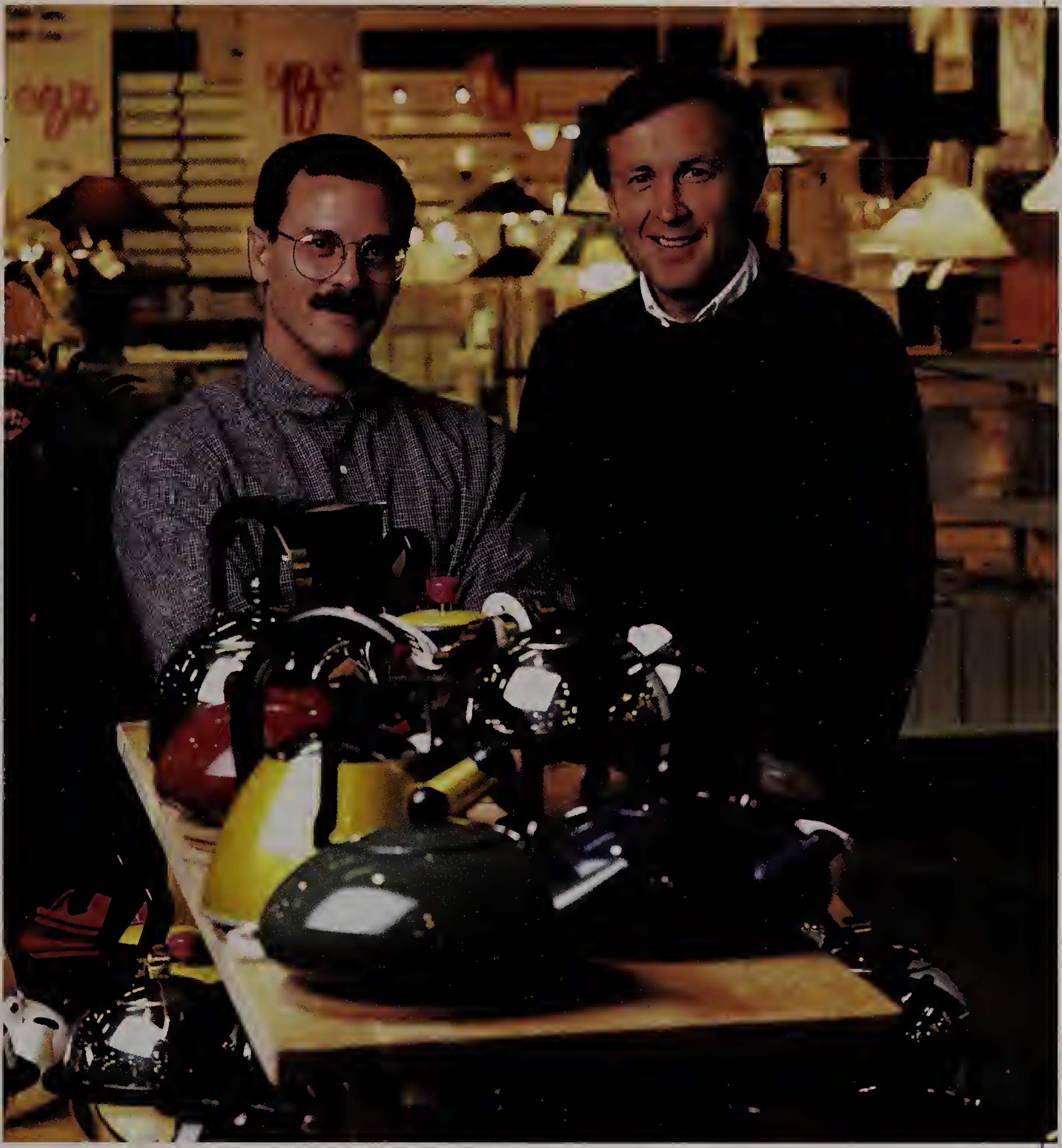
"The best way to move quickly into countries is to keep systems as simple as possible," Healey said. "Smaller size allows you lots of flexibility. It lets us get established quickly and start growing." If the push for European unity remains on track, Healey could bring in the big systems that have served Toys 'R' Us so well back home.

COMPANIES developing close trading ties abroad face the additional constraint of having to bow to foreign ways of conducting business. Exabyte, a $250 million manufacturer of computer storage devices headquartered in Boulder, Colo., has formed strategic partnerships with the Sony Corp. and Kubota Ltd. in Japan (see "Fancy Footwork," *CIO*, August 1992). While Exabyte, recently named by *Fortune* magazine as one of the fastest-growing U.S. companies, is all ready for the brave new world of borderless, networked companies, Japan's consensus culture has proven stronger than the vision of computer-integrated partnerships.

Exabyte is equipped to exchange data electronically with its suppliers and customers, and its factory can electronically exchange CAD drawings and issue manufacturing change orders, according to Geoff Cooper, director of information systems. The company also keeps a full electronic record—from the original order through design, manufacturing, shipping and service—on each of the 400,000 units it has shipped. But Sony and Kubota prefer to confer with Exabyte officials rather than accept electronic drawings and change orders, or use EDI. (Sony supplies and helps design Exabyte's tape-drive assemblies, and Kubota—a past Deming Award winner [Japan's equivalent of the Baldrige Award for quality]—both markets Exabyte equipment in Japan and manufactures more than half of the tape drives Exabyte sells.) "We can transmit the changes, but [Kubota and Sony] want to discuss their technical merits rather than simply adopt them," said Frank LaHue, senior vice president of operations.

Kubota's and Sony's reluctance to take full advantage of IT appears "a little bit strange" to Cooper. "With Kubota we do some very basic-level transfers of information," he said. "We get floppy diskettes from them. We dial up and get info from them."

LaHue acknowledges that the Japanese insistence on consensus can be "terribly frustrating" for his IS and engineering staff; he knows the arguments for electronic integration. But he also understands the benefits of consensus. "You not only get the results but the spirit of the discussion, which ends up with generally better results."



KERRY RUHL *(left) and* **GORAN CARSTEDT:** *Ikea's success is due in part to maintaining a strong Scandinavian identity and its own corporate culture while subtly adapting to local markets.*

PHOTO BY EUGENE MOPSIK

Companies that want their products to succeed in foreign markets must pay attention to cultural differences among consumers as well. While these are not terribly important when deciding how a tape drive should function, they are when designing home furnishings. For instance, according to Göran Carstedt, president of Ikea North America in Plymouth Meeting, Pa., Swedes generally like to sit on hard sofas and lie on soft beds; Americans like to sit on soft sofas and sleep on firm beds.

Ikea, a $5 billion home-furnishings company from Sweden that opened its first U.S. store in 1986, is an old hand at bridging cultures; it operates throughout Scandinavia and in six other European countries and Canada. Part of Ikea's successful formula is maintaining a strong Scandinavian identity and its own corporate culture while subtly adapting to local markets. In the United States, Ikea's management must inculcate its American workforce in the Ikea culture, and its buyers must train American suppliers to manufacture to Ikea's specifications. Meanwhile, the company's Swedish furniture designers and managers need to understand the American market and workers.

Like Exabyte, Ikea has a global communications network. Carstedt can easily send messages to his counterparts anywhere the company operates. The same goes for Ikea's purchasing, distribution and logistics staff. But Ikea does not use technology to teach Americans to work like its Swedish employees, or Swedes to understand Americans. "We take our Swedish designers here to America," said Carstedt. "We let them live with American families and take them to malls to see what the competition is doing." And back home in Sweden, Ikea's designers and buyers do not try to manage its U.S. suppliers centrally or use EDI. Rather, they rely on the company's American "trading office" to maintain personal contact with suppliers, Carstedt explained, and Ikea's systems must adapt to local patterns.

"Europe tends to have more of a cash-and-carry buying pattern," said Kerry Ruhl, the American MIS director of Ikea North America. "In the U.S., it's checks and credit cards. We've had to make some significant modifications to our store systems to accommodate that buying style."

Ruhl also had to rewrite Ikea's

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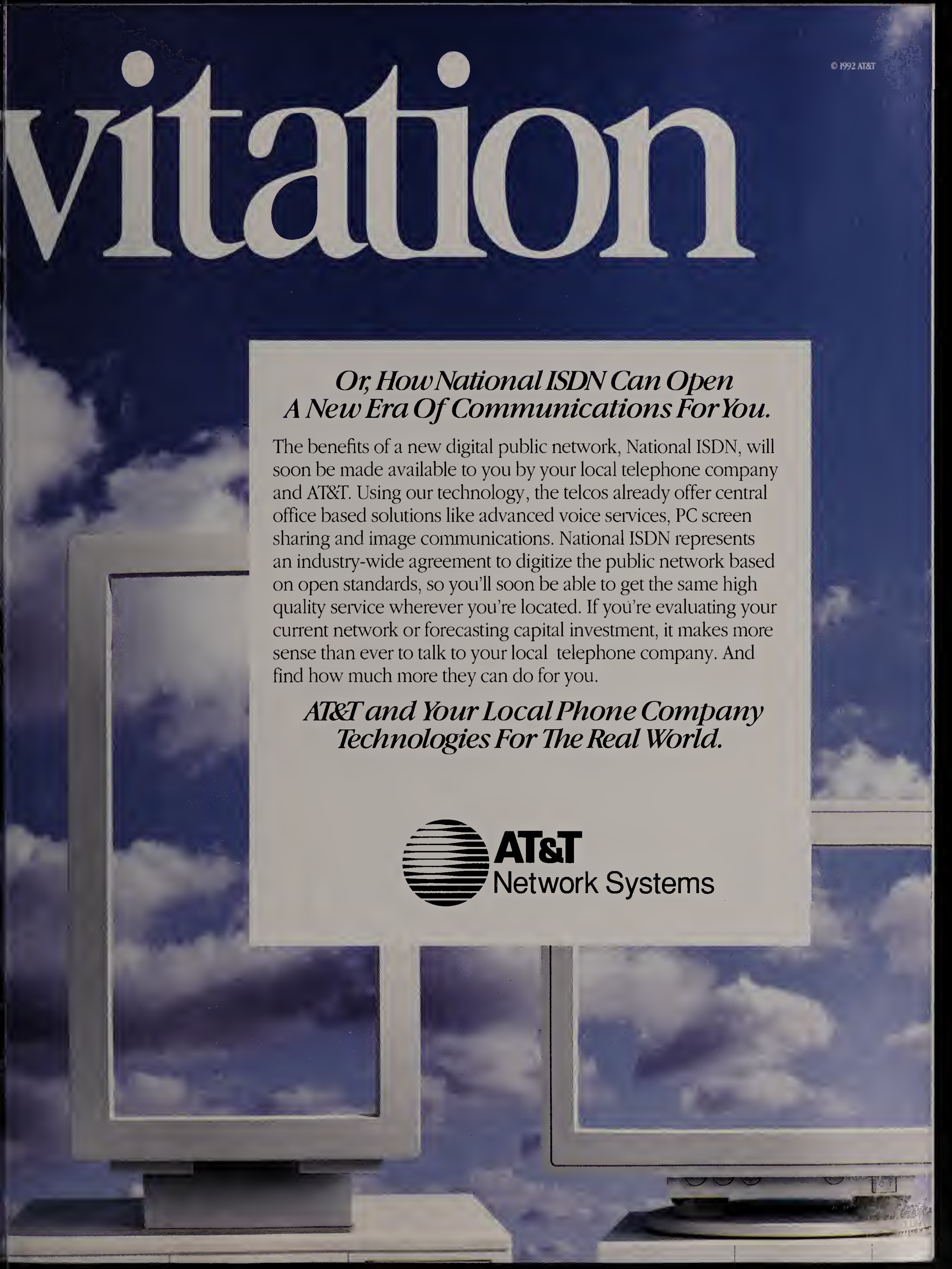

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A World of Differences

The need to meet national regulations or adjust to cultural differences can create a lot of work for IS

▸ When bicycle and race-car helmet maker Bell Sports began exporting to Europe, the IS staff back in its Rantoul, Ill., factory ran headfirst into European safety regulations, according to Ken Coleman, president of Bell Sports' European subsidiary, Euro Bell S.A. "We can't just ship the same product we sell in Muncie to Stuttgart," said Coleman. Not only do different safety standards apply, but some countries require statements on the package and labels inside the helmets saying the helmets conform to those standards. To efficiently get the right labels on the right helmets, Bell must improve its order-management and MRP-II systems. That means upgrading existing factory systems in the United States and installing advanced systems in its new factory in France.

▸ When Federal Express expanded outside the United States, the cultural nuances of billing became a big deal. In Britain, customers don't pay from an invoice, but from a statement sent after the invoice. And the Japanese are apparently quite fussy about invoicing protocol: Invoices must be sent within a specific time period after the sale, and payments must be made within a specific time period after receiving the invoice. Invoices must be sent in a specific format, too. It's such a sensitive area that Federal Express CIO Dennis H. Jones declined to give an actual example, for fear that a Japanese reader might be offended if it were the least inaccurate.

▸ Kerry Ruhl, MIS director of home-furnishings retailer Ikea North America, found he had to adapt Swedish systems to American requirements and vice versa. For example, his IS staff had to do some "keyboard mapping" so the company's North American staff could print reports with umlauts. Furthermore, a number of the American systems were unable to generate reports on Euro-sized paper stock. That required Ruhl's staff to adjust the printing instructions in the system.

No wonder everyone interviewed for this article insisted that technology can't bridge cultural gaps. Only face-to-face meetings can fully convey such nuances. "Just communicating the facts is not even close to being sufficient to getting the job done," said Coleman. *–A. Alter*

systems so American customers could arrange to have furniture shipped to their homes. "In Europe, the transport company takes ownership of the order, and customers pay [the shipper] cash on delivery. In North America that's so unusual that we had to modify our systems to take payment in advance, and down payments with balance due before delivery."

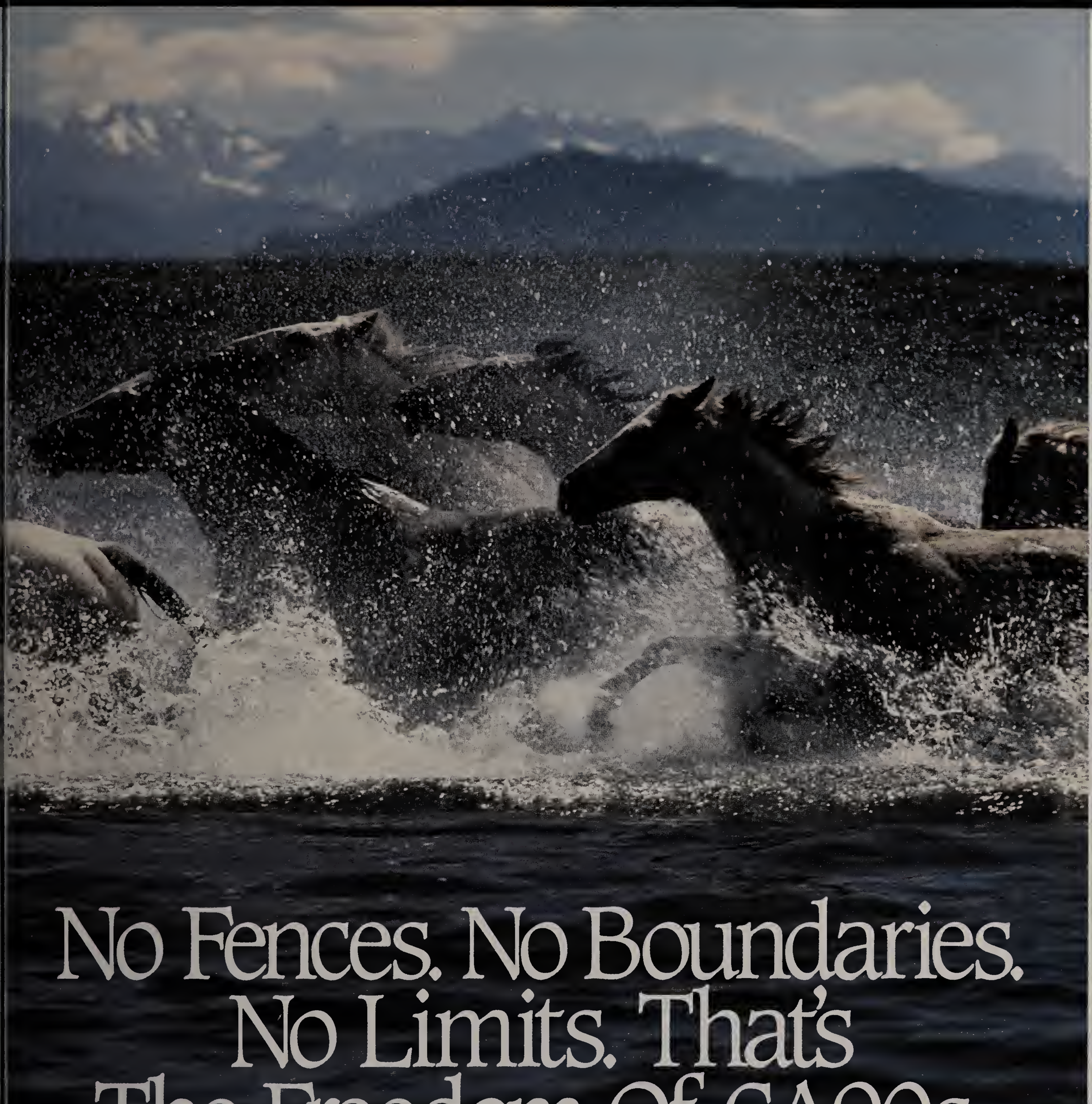
While technology cannot mold the world in a company's image nor substitute for person-to-person contact, it can significantly contribute to an overseas expansion effort. In addition to helping mitigate the problems created by global distances and differing time zones, IT can be used to attract new customers, ease the internal tensions that come with globalization and pave the way for future growth.

Appreciation for good customer service, it appears, is a universal human trait. Expanding companies see this as an area where IT can definitely be used to advantage. When Toys 'R' Us cut back its applications as part of its overseas effort, it kept the ones that directly affect customers at checkout time: point-of-sale and credit-checking systems. And when Federal Express cut back its European business, its renowned package-tracking capabilities and its other IT-based customer services accounted for much of the continuing loyalty of its European customers, according to CIO Dennis H. Jones.

Finding the right balance between local autonomy and central control is an issue all companies must face when they expand overseas, according to Harvard's Hayes. "As companies get more involved in local markets and [product] design, they require more and more nationals to run the business, because as [a foreigner] you don't understand the local market. How do you staff [your overseas organization], maintain your staff and give them resources to grow while maintaining control and common corporate identity throughout the world?"

> "GOING OVERSEAS IS A LOT OF FUN: YOU GET TO REVISIT THE MISTAKES OF YOUR PAST AND REAPPLY YOUR EXPERIENCE WITHOUT THE BAGGAGE. HOW MANY TIMES HAVE YOU SAID, 'IF I COULD DO IT OVER AGAIN....' "
>
> *–Dennis Healey*

Networks and telecommunications are not a cure-all, but they can act as a lubricant for business frictions. They make it easier for headquarters to support overseas offices with timely information and data, and for outposts to frequently update and consult with headquarters. Exabyte,



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KEN COLEMAN: *Expansion abroad can be an opportunity to try out new technology.*

PHOTO BY GEORGE SIMIAN

for example, uses telephones, fax machines, electronic mail and electronic bulletin boards to keep its worldwide staff in tune with one another. "The board can be gotten to anywhere in the world," said Cooper. "It keeps people in the field informed on what is going on with a specific customer, issues we are trying to fix and engineering changes." Cooper, who knows from experience what it's like to be on the European end of an American operation (he once worked in another American company's British IS group), said these links are a boon to his IS staff in Exabyte's service and repair facility in Scotland. "My team here has a real empathy with the group in Scotland.... They don't feel as remote as I used to feel."

One of the most important things a CIO can do for a newly international company is to ensure an IT foundation that provides for the future. According to their peers and consultants, such CIOs should follow an IT version of the Hippocratic oath: Do nothing that will be a constraint later on. Like Toys 'R' Us's Healey, others counsel that the organization strive for simplicity and flexibility when beginning an overseas venture. "You've got enough worries when you go to Europe and Asia that you shouldn't have to worry about a lot of IT stuff at the same time," said C. Rudy Puryear, the Chicago-based managing partner for Andersen Consulting's information and technology strategy practice for North and South America.

Puryear suggested that companies avoid duplicating their efforts by extending their U.S. IT infrastructure as much as possible and using telecommunications vendors for network services instead of building private networks. Ikea's Ruhl stressed selecting internationally portable standards, like Edifact and SQL, and finding vendors who could provide adequate support as an organization enters a new country. Ikea chose IBM for its POS systems in North America instead of Siemens-Nixdorf, its European POS vendor, in order to ensure adequate maintenance support for its American infrastructure.

Some companies, however, see expansion as an opportunity to gain experience with a new technology before bringing it to the United States. Bell Sports, a $65 million bicycle and racing-car helmet manufacturer in Rantoul, Ill., is installing MRP-II and order-entry systems to run its plant in Roche-la-Molière, France. The systems are more advanced than those in its American factory, according to Ken Coleman, president of Bell Sports' European subsidiary, Euro Bell S.A. Healey hopes to do the same for Toys 'R' Us.

"Look at all the new technology that has fallen at our door," said Healey. "Our international expansion coincides with [the rise of] client/server, downsizing and multimedia, and advances in communications. If we can leverage these technologies in Europe, we can advance the information systems at Toys 'R' Us....

"Going overseas is a lot of fun," Healey said: "You get to revisit the mistakes of your past and reapply your experience without the baggage. How many times have you said, 'If I could do it over again....' " CIO

Additional Reading

For more information on the IS aspects of doing business abroad, please see the following stories from past issues of CIO:

"Parlez Vous '92?"
May 1990; Page 8
An Insights column on the implications of a unified European market

"Networking Made EC"
September 1, 1991; Page 18
An Insights column on the ins and outs of building a European telecommunications network

"Globe Trotters"
January 1992; Page 42
How UPS, the U.S. Marine Corps, Turner Corp. and Dow Chemical set up their international networks

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PEN AND INC.

In a variety of environments, the pen is proving to be a convenient tool for data entry, manipulation and retrieval. And while pen computers have yet to take the business world by storm, it isn't too early for even the most cautious CIO to consider where pen technology might be used effectively.

LIKE ANY TECHNOLOGY IN ITS infancy, pen computing has its problems. For starters, the computer itself is never quite right: Either you can't read the screen, the batteries run down at a critical moment or the damn thing's just too expensive. Then there's the software: So far, there isn't much of it around.

Yet despite its limitations, pen computing is proving very useful for certain vertical applications. Since 1989—the year GRiD Systems Corp. introduced its lightweight tablet, the GRiDPAD—rudimentary pen computers have been replacing pen and paper as data-collection tools.

To accommodate the increasing demand as more users put pen to screen, a community of vendors, systems integrators and application developers is growing up around pen technology. Last spring—after three years of experimentation with first-generation pen systems—a second generation of pen products made its debut.

April was a particularly eventful month for pen aficionados. First Microsoft Corp. released version 3.1 of its Windows operating system, Windows for Pen. Days later, IBM threw its weight into the pen arena with the introduction of the 386-based Thinkpad, one of several new 386-based pen products.

While many managers may prefer to postpone a significant investment in pen computing hardware, it isn't too early for even the most cautious to start thinking of jobs that might be efficiently performed with a pen device. These could include jobs now being performed manually or with traditional computers, or jobs previously not possible at all. It may even be time to start developing a pilot application.

The biggest factor influencing the success of any pen project is end-user participation, said Allen Isaacson, an analyst at Dream IT Inc., headquartered in Colorado Springs, Colo. "You have to spend quality time with end users in developing the application itself," Isaacson said. "You must involve them from the beginning. The successful implementations to date have all done that."

Managers can start encouraging user input even before they select an

BY LUCIE JUNEAU

PHOTO BY RALPH MERCER

operating environment or a hardware platform, Isaacson said. If they do, users will have a sense of ownership over the project and their new tool. "It can't just be dumped on them from upper management."

Some individuals whose jobs involve collecting field data may be unfamiliar with computers. If they don't participate in planning for the new technology, they may react poorly to it. "There is the potential for a new level of hostile user," Isaacson said. Portable pen computers can easily be broken—and quite possibly will be if users don't like them, he warns. (Most resistant users aren't quite so militant; like Melville's Bartleby the scrivener, they simply "prefer not to" use their pens.)

Of course, before approaching users, managers need to identify areas where the pen computer could add value and provide a good return on investment. To make that determination, many need a better understanding of how pen systems work.

THE PEN, OR STYLUS, ON A PEN computer can function in a variety of ways. As a tool for entering text, it provides an alternative to a keyboard. Used as a mouse, it can indicate direction and user selections. As an editing tool, the pen can delete or move text, for example. It can also be used to enter handwritten information—including signatures, notes and hand-drawn graphics—which can be saved as images.

The pen excels in some of these roles and falls short in others. Its success as an alternative means of entering text depends largely on the quality of the text-recognition software with which it works. Unfortunately, that software has a long way to go.

"Handwriting recognition is not where a lot of people would like you to believe it is," said Don Zimmerman, an applications developer at PRC Engineering Systems Inc., a systems development firm in Lisle, Ill. Today's systems are persnickety. They recognize only printed letters, not script (although Palo Alto-based Lexicus has announced it will be shipping a system that recognizes cursive writing by the end of the year). And because they're slow and error-prone, they're really only useful for recognizing a word or two of printed information at a time.

"If you put an application in front of someone that requires writing sentence upon sentence, you will have a very disgruntled user very quickly," Zimmerman said. The answer is to work around the technology's limitations and provide applications that emphasize its strengths.

As a replacement for the mouse, the pen is a hit because it feels more natural and allows users to draw directly on the screen. It's no surprise that forms-based data-collection applications—relying heavily on pick lists and check boxes—have been among the first to be used on pen systems successfully.

Pen systems are especially useful when the data collected must later be entered into a computer (see related story, Page 50). "If you can collect the information [electronically] right then and there, you can make an order of magnitude of difference in the velocity of information flow," said Sam Wiegand, president of Pen Pal Associates Inc. in Los Altos, Calif., developer of the Pen Pal application-development tool. Some portable data-collection units—such as Inforite Corp.'s AS1050, used by UPS—take advantage of the pen's ability to serve as a recording device for signatures and other handwritten input.

The newest data-collection pen devices, such as GRiD's PalmPAD, Fujitsu's PoqetPad and PI Systems' Infolio, weigh in at under three pounds and sell for around $2,000 or less. But when users want to do more than simply enter data, they may need more processing muscle than these small machines provide.

What the Doctor Ordered

Many IS managers are experimenting with the use of pen devices for data retrieval as well as collection—particularly for users such as physicians who have been slow to take advantage of traditional computer resources

In the health-care community, where physicians are considered to be among the hardest users to please (when and if they can be cajoled into using computers at all), some IS managers are turning to pen systems to provide easier, more user-friendly access to computer-based information.

At the Washoe Medical Center in Reno, Nev., physicians are encouraged to make use of a central database including lab results, radiology information, medical transcripts and the like. But although most physicians appreciate the value of the available information, they seldom access it. "Getting [physicians] to use the system is hard," said Marlene Madraso, manager of application resources.

To pique their interest, Madraso recently ordered the Ultralite, a pen-capable notebook from NEC including optional cellular communications capabilities. With the help of the notebook, a physician could call in to the Center's central database from home—or just about anywhere—and review a patient's records before visiting the patient in person, perusing the available information by using the notebook's pen to select menu options on the screen. The hope is that the pen feature will make computer usage "more fun and less like work," Madraso said.

At Rose Medical Center in Denver, physicians in a pilot program are using PCs equipped with pens to access their system's central database from their offices. Particularly responsive to any ameliorations that can save them time, physicians—who tend to be computer neophytes—often prefer the pen over a mouse, which isn't all that easy to manipulate at first, said Ted Cline, director of information systems. The Center's applications can be accessed via pen, mouse or keyboard—whichever comes easiest.

"Physicians in the prototype environment are elated to get all of the clinical information that doesn't always make it back to their patients' charts in the timeframe they want," Cline said. They also report that there are "unbelievable advantages" to being able to access information from their offices, he said. Thanks to the positive feedback, the prototype program is being expanded to include more physicians.

–L. Juneau

> *"If you can collect the information [electronically] right then and there, you can make an order of magnitude of difference in the velocity of information flow."*
>
> *–Sam Wiegand*

SEVERAL PEN COMPUTERS—including NCR's 3125, IBM's Thinkpad and the GRiD SL386—include 386SL processors. Very new to the market, these high-end tablets have yet to generate much feedback from users. They're portable and therefore suitable for mobile users who need to enter data, but they also provide the processing power and memory to run a variety of applications. (A user who collects data in the field might want to go back to the office and analyze it, for example.) The new 386s typically run Windows for Pen, GO's PenPoint or Communication Intelligence Corp.'s (CIC's) PenDOS; many offer users a choice of pen environments. Most 386s weigh between three and six pounds and cost around $3,000.

A few 486-based products—Montreal-based MicroSlate's Datellite, for instance—have also hit the market. These units may be particularly useful for running graphics-intensive field applications.

Recently, pens have migrated into the PC notebook market. The new pen-enabled notebooks, or "pentops," provide users with a pen in addition to a standard keyboard. They appeal to notebook users like Pat Fahey, a consultant based in San Luis Obispo, Calif., who would rather use a pen than a mouse when traveling. "I never liked using the mouse with a notebook," Fahey said. "I had a couple of clip-on-the-side mice and would end up not taking them with me. A pen is lighter, less bulky to carry and tied to the machine, so I can't lose it." Pentops can be particularly useful on planes, where using a mouse is awkward.

In September, Momenta Corp., one of the first vendors to debut a pentop, filed for Chapter 11 bankruptcy protection. The event sent shivers through the nascent pentop industry, but most analysts attributed the company's failure to poor management and bad timing. "[Momenta] started before pen technology was really ready," said Portia Isaacson, president of Dream IT. But Momenta's demise hasn't closed the book on pentops. NEC Technologies Inc. offers a pen-capable 386SL notebook (see related story, Page 48), and GRiD is scheduled to introduce its own pentop later this month.

All of the more powerful pen computers, including 386-based tablets and pentops, require more battery power—and run down more quickly—than smaller, less powerful units designed primarily for data entry. A pen computer's operating time between recharges ranges from about two hours to about eight. Users typically choose between battery life and screen quality: Computers with high-quality, backlit screens use more power and run down more quickly.

Fujitsu and PI Systems have what some consider to be a nifty solution, albeit one that may only be practical for small pen computers. Fujitsu's PoqetPad and PI Systems' Infolio both use AA alkaline batteries. Although the batteries aren't rechargeable, they provide longer operating times—about eight to 12 hours—and are easy to replace.

You don't have to own a pen-based computer to run pen applications. Some vendors, including SuperScript, Wacom and CalComp, offer pen-and-tablet add-on devices for desktop PCs for well under $2,000. Such units may be ideal for applications in which customers fill out forms, said Dream IT's Allen Isaacson, such as in emergency rooms, at hotel registration desks or at car registration offices.

A new breed of pocket-size personal organizers and communicators offers the newest niche for pen technology. Apple Computer Inc., for example, is building a pen into the first of its Newton products. Due to be released early next year, the first Newton is a RISC-based electronic notepad for notetaking, drawing, calculating, scheduling and communicating. Meanwhile, AT&T plans to release a pen-based communicator developed in collaboration with GO Corp., and an electronic organizer from Sharp—the Wizard 8900—is already on the market.

Consumer Reports

By arming survey participants with pen computers, Chrysler eliminated the need to rekey data, speeding the delivery of evaluation results from three weeks to a few hours

When managers at Chrysler Corp. first got wind of pen computing, a use for the new technology came quickly to mind. Auto companies like Chrysler frequently invite consumers in to evaluate new models. In the past, these consumers would fill out lengthy questionnaires, and market-research personnel would later enter their answers into a database. Chrysler had to wait two to three weeks to see the results.

Now as consumers climb in and out of drivers' seats, open and shut doors and check out the trunks, they complete a forms-based application on portable GRiDPADs. Because this new practice eliminates the need to reenter data, information can be compiled in a few hours.

The application was created by Advanced Data Research of Bloomfield Hills, Mich., a maker of pen-based software for market-research applications. The system took six months to complete and has been in full operation since May 1991.

Using a pen system eliminates the introduction of errors in the rekeying process, said David Bostwick, director of business planning and research at Chrysler in Highland Park, Mich. Before, if a mark on a questionnaire wasn't in the right place, the data-entry person had to guess the answer, he said.

The technology is having a direct impact on Chrysler's bottom line. "It saves in terms of paper costs, [questionnaire] production costs and data-entry costs," Bostwick said. "This investment should probably pay for itself in at the most three years, maybe [in as little as] a year and a half." *–L. Juneau*

A HANDFUL OF PEN OPERATING environments are currently available. Since there is a large installed base of Windows users—and innumerable Windows applications—Windows for Pen may become the pen operating environment of choice. (Development tools for this environment include Microsoft's Visual Basic and Borland's ObjectVision, which are already familiar to Windows developers.) GO's PenPoint environment, created especially for pen-based systems, has been selected by IBM for use with its Thinkpad. Its user interface is modeled after a notebook, with tabbed sections for storing and accessing documents, for example.

With CIC's PenDOS, users can leverage existing DOS applications. "You add a little software to create a new user interface," said Jeff Dao, director of applications engineering and product management at CIC. Forms-based applications typically run in environments like GRiD's PenRight, a DOS environment developed for the GRiDPAD that has been licensed for use with other portables, including Fujitsu's PoqetPad and NCR's 3175.

There are several development tools, including Pen Pal Associates' Pen Pal, for use with PenRight and other operating environments. Some allow developers to defer the choice of an operating environment. Applications created with Slate Corp.'s PenApps can be ported to either PenPoint or Windows by making minor changes to the C code. A similar product, Zinc Software Inc.'s Zinc, postpones the PenDOS-versus-Windows decision.

With a wider base of potential users and the availability of new, more powerful computers, operating environments and development tools, pen computing appears poised to move beyond its vertical, data-collection niche into more general use. But for those whose expectations hover a few inches off the ground, a little reality check: Few existing pen applications have yet to graduate from their pilot programs.

> *Before approaching users, managers need to identify areas where the pen computer could add value and provide a good return on investment.*

"Right now, there's not a very large installed base of equipment, and the market is very, very small," said William Bluestein, senior analyst with Forrester Research Inc. in Cambridge, Mass. There are "well under" 200 software applications on the market, Bluestein said. Consequently, most organizations develop their own applications or hire developers to do it for them. "There will have to be a lot more hardware out there before a lot of the independent software vendors start to focus on this market as a lucrative opportunity," he said. "We don't expect to reach large volumes until '94 or '95. By 1995, there'll be over 900,000 [installed] units in the U.S."

Lucie Juneau is a freelance writer based in Salem, Mass.

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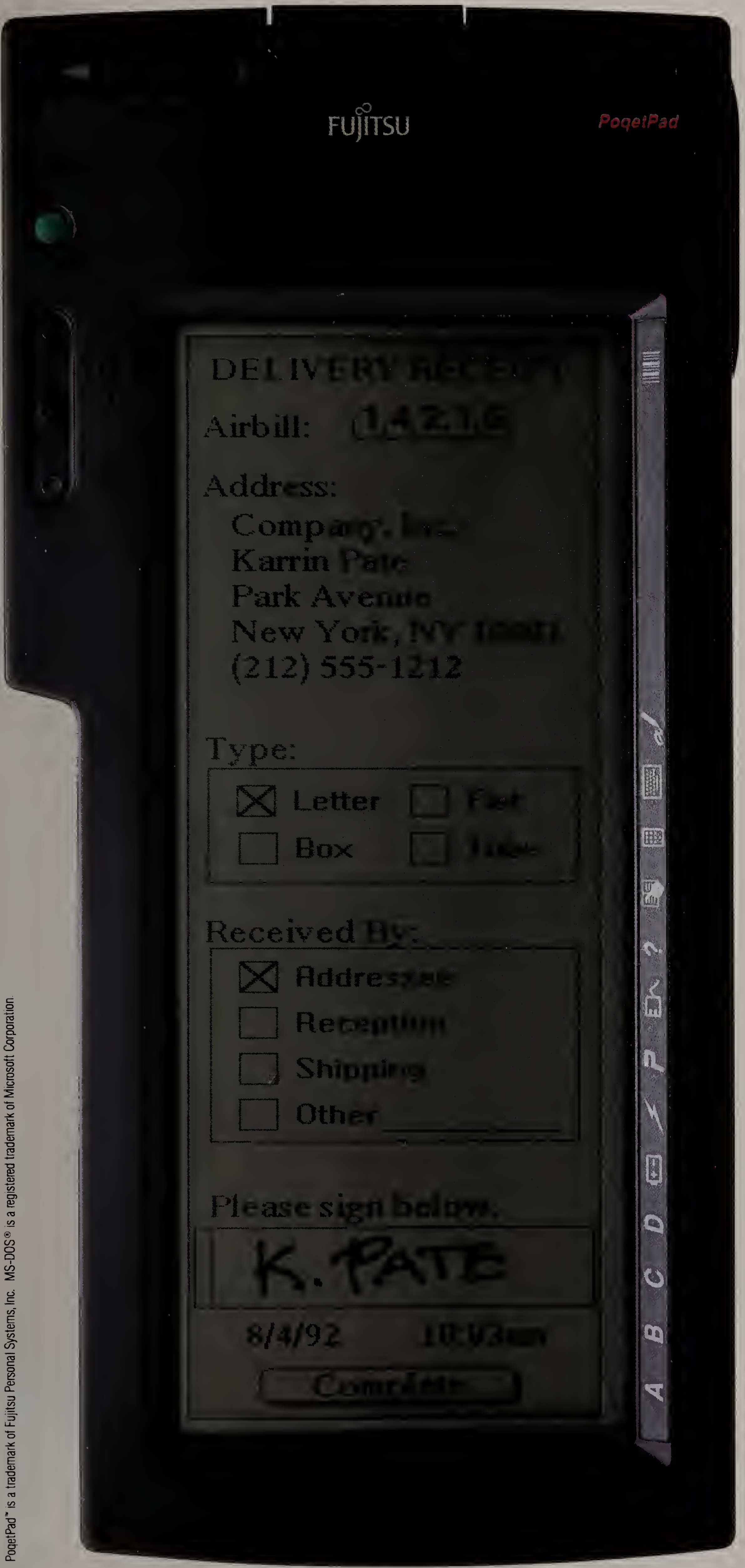

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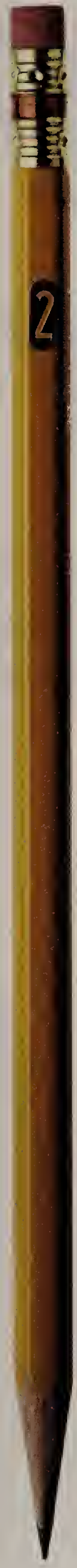

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The Year in Review

An index of all major articles published in *CIO* in 1992, including a cross-reference by article type

Articles are numbered in sequence from the first issue of CIO. (See past Decembers' issues for guides to stories published prior to January 1992.) To help readers find articles of interest, we've added a cross-reference of categories at the end of the listing. For example, readers interested in industry overviews would look up the articles numbered 489, 505, 537 and 546.

JANUARY 1992

432. "The Call for Leadership" *(Page 22)—how CIOs can play a leadership role in helping their companies prosper. By David Freedman*

433. "Globe Trotters" *(Page 42)—the payoff of setting up transnational networks. By Meghan O'Leary*

434. "Surveying the Field" *(Page 50)—getting up close and personal when it comes to appraising performance. By Richard Pastore*

435. "Making the Grade" *(Page 56)—the benefits of sponsoring university IS research flow both ways. By Arielle Emmett*

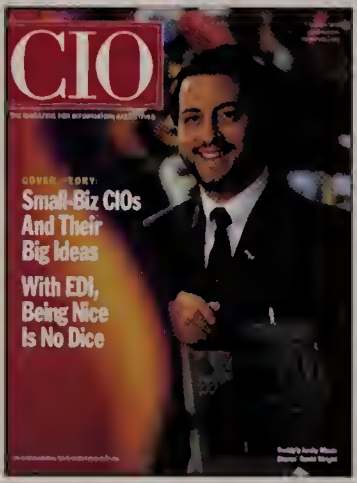
436. "Mission: Critical" *(Page 18)—an Outlook column on CIOs and the recession. By James A. Champy*

437. "Going Beyond AI" *(Page 62)—a State of the Art column on artificial neural networks. By Mickey Williamson*

438. "Value-Added E-Mail" *(Page 68)—a Working Smart column on Hughes' E-mail system. By Megan Santosus*

FEBRUARY 1992

439. "Looking for Networking's Mr. Big" *(Page 28)—Is there such a position as the Chief Networking Officer? By Thomas Kiely*


CIO
COVER STORY
Small-Biz CIOs And Their Big Ideas
With EDI, Being Nice Is No Dice

440. "Working to Scale" *(Page 36)—the problems faced by CIOs at small companies. By Kathleen Melymuka*

441. "The High Price of Nice" *(Page 56)—Sears takes a harder line to get trading partners to jump on its EDI bandwagon. By Richard Pastore*

442. "Cyberspace Cadets" *(Page 66)—What is the true nature of a hacker: budding criminal or computer genius? By Thomas Kiely*

443. "Ordering Out for IS" *(Page 18)—an Outlook column on the intriguing benefits of outsourcing. By Julie Schwartz*

444. "Support Groups" *(Page 25)—an Insights column on third-party software escrow arrangements. By Adele Kalas*

445. "Team Tactics" *(Page 74)—a Human Factors column on self-managing teams. By Harvey Shrednick, Richard Shutt and Madeline Weiss*

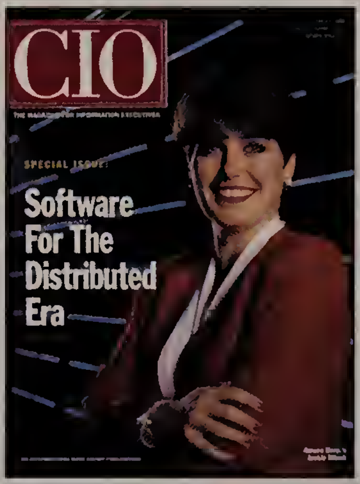
446. "Helping Users Program" *(Page 80)—a State of the Art column on end-user programming tools. By Lucie Juneau*

447. "SuperSONIC" *(Page 88)—a Working Smart column on MetLife's distributed sales network. By Megan Santosus*

MARCH 1992
Special Software Issue

448. "Progress in the Pipeline" *(Page 38)—Amoco's measured approach toward distributed processing. By David Freedman*

449. "How to Be Wary Without Waffling" *(Page 46)—CIOs need to move forward without moving too far or too fast in the wrong direction. By Meghan O'Leary*



450. "A Promising Harvest" *(Page 56)—vendors cultivate a burgeoning crop of distributed-computing tools. By Richard Pastore*

451. "Systems on a Shoestring" *(Page 66)—devising schemes for getting more mileage out of limited software budgets. By Thomas Kiely*

452. "The Human Factor" *(Page 74)—building a top-notch staff in the era of distributed computing. By Kathleen Melymuka*

453. "The Fork in the PC Road" *(Page 32)—an Insights column on the choice between Microsoft Windows and IBM's OS/2. By David Passmore*

454. "Inner Resources" *(Page 82)—a Human Factors column on effective technology trainers. By Ruth Colvin Clark*

455. "Getting IT Together" *(Page 86)—a State of the Art column on interoperability. By Melvyn E. Bergstein, Roderick S. Walker and Timothy McBreen*

456. "Computer-Aided Crime Prevention" *(Page 96)—a Working Smart column on the Minneapolis Police Department's 911 system. By Megan Santosus*

APRIL 1, 1992

457. "Team Boosters" *(Page 36)—how CIOs can support manufacturing enterprises. By Allan E. Alter*

458. "The Image Makeover" *(Page 44)—how imaging causes workplace transformation. By Richard Pastore*

459. "New Bonds on Wall Street" *(Page 52)—six Wall Street firms collaborate with information technology. By David Freedman*

460. "Sympathy for the Consultant" *(Page 27)—a First Person column on the new, reengineered Tripp Strange. By Tripp Strange*

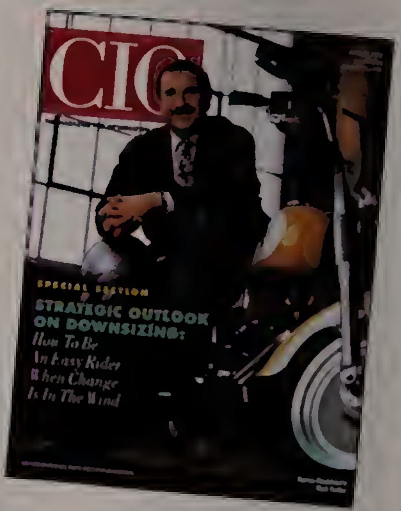
461. "The Virtuous Virus" *(Page 30)—an Insights column on the beneficial use of viruses. By Fred Cohen*

462. "Simplify, Simplify" *(Page 58)—a State of the Art column on RISC technology. By David Freedman*

463. "Taking Care of Patient Data" *(Page 64)—a Working Smart column on Lutheran Hospital's bedside computers. By Megan Santosus*

APRIL 15, 1992
Strategic Outlook on Downsizing

464. "Intimate Technology, and All That Jazz" *(Page 28)—a profile of*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465. "Keeping Up with the Ins and Outs" *(Page 33)—downsizing's mixed bag of payoffs, tradeoffs and unanswered questions. By Thomas Kiely*

466. "Hearts and Minds" *(Page 44)—dealing with the culture shock of downsizing. By Meghan O'Leary*

467. "Nuts and Bolts" *(Page 48)—managing the thorny technical issues that bedevil downsizing organizations. By Thomas Kiely*

468. "Means to an End" *(Page 54)—Brush Wellman's downsizing and reengineering project. By Meghan O'Leary*

469. "Profiles in Management" *(Page 24)—an Insights column on a recent SIM survey. By Edward R. Mills*

470. "The Shadow Analysts" *(Page 58)—a Human Factors column on independent systems specialists. By David J. Marley and Don W. Meyers*

471. "Listening In" *(Page 62)—a State of the Art column on voice recognition technologies. By Elaine Cascio*

MAY 1, 1992

472. "The Perils of Power" *(Page 24)—how managers can effectively enact worker empowerment. By Thomas Kiely*

473. "Integration for Sale" *(Page 34)—managing the relationship with a systems integrator. By Meghan O'Leary*

474. "The Mad Doctor of Corporate Travel" *(Page 44)—a profile of Rosenbluth Travel. By Richard Pastore*

475. "Here, There and Everywhere" *(Page 52)—the art of logistics, and how it applies to the entire distribution pipeline. By Lucie Juneau*

476. "Combating Complexity" *(Page 20)—an Insights column on business reengineering. By Robert M. Rubin*

477. "Well Connected" *(Page 58)—a State of the Art column on middleware. By Barbara E. Sannerud*

478. "Held Over by Popular Demand" *(Page 64)—a Working Smart column on D&B Software's videoconferencing system. By Megan Santosus*

CIO
SPECIAL SECTION
STRATEGIC OUTLOOK ON SUPERNETWORKING:
How To Cure The Common Infrastructure

MAY 15, 1992

Strategic Outlook on Supernetworking

479. "Changing the Rules" *(Page 30)—coming up with new metrics to gauge business success. By Scott Wallace*

480. "The Big Band Era" *(Page 37)—preparing for the impending explosion of high-bandwidth applications. By David Freedman*

481. "The Band Plays On" *(Page 48)—CIOs who don't adopt supernetworking may find their networks out of tune. By Allan E. Alter*

482. "Health Care's Band Leader" *(Page 50)—Minnesota's largest health-care provider's trial of high-speed, high-bandwidth networking. By Allan E. Alter*

483. "The Dean's List" *(Page 54)—an interview with Wharton Dean Tom Gerrity. By Allan E. Alter*

484. "Do the Right Thing" *(Page 26)—an Insights column on ethics in the computer profession. By Don Gotterbarn*

485. "Frontline" *(Page 62)—looking forward to the day when computers are as ubiquitous as toasters. By Portia Isaacson*

486. "The Objective Approach" *(Page 70)—a State of the Art column on object-oriented technology. By David Freedman*

JUNE 1, 1992

487. "Birth of a Salesman" *(Page 30)—once-complacent CIOs are learning to sell their services internally. By Meghan O'Leary*

488. "The Education of a Line Manager" *(Page 38)—a profile of Whirlpool Corp.'s Walt Coleman. By Lucie Juneau*

489. "Gearing Up" *(Page 48)—Detroit's Big Three are investing heavily in IT-supported process changes. By David Freedman*

490. "Open-Ended Efforts" *(Page 55)—various open-systems organizations are moving the standards-setting process along. By Megan Santosus*

491. "Keeping the Faith" *(Page 26)—an Insights column on the reemergence of CIM. By Joel A. Schnur*

492. "Make Room for DASD" *(Page 62)—a State of the Art column on data storage. By Kathleen Melymuka*

493. "Waste Not, Want Not" *(Page 72)—a Working Smart column on HFSI's systems reengineering project. By Megan Santosus*

JUNE 15, 1992

Strategic Outlook on Measurement

494. "Big WAN on Campus" *(Page 38)—Drew University's pervasive use of computers and communications technology. By Megan Santosus*

495. "The Measure Hunt" *(Page 59)—CIOs need concrete measures to estimate the value of technology. By Thomas Kiely*

CIO
SPECIAL SECTION
STRATEGIC OUTLOOK ON JUSTIFYING TECHNOLOGY:
CIOs Inch Toward New Ways of Valuing IT's Contributions

496. "Many Happy Returns" *(Page 66)—Information Economics rates projects in relation to their contribution to stated business objectives. By Richard Pastore*

497. "The Users' New Clothes" *(Page 76)—IS must enlist end-user help in measuring the business benefits of IT. By Thomas Kiely*

498. "Not Measuring Up" *(Page 84)—survey results from CIO and the Executive Insight Group. By Dudley P. Cooke and Edward B. Parrish*

499. "Getting the Message" *(Page 32)—an Insights column on marketplace dynamics, organizational structures, and the flow of information. By Daniel S. Appleton*

500. "Student Teachers" *(Page 92)—a Human Factors column on the Odyssey of the Mind program. By Thomas M. Mauro*

501. "Virtual Capitalists" *(Page 94)—a State of the Art column on virtual reality. By Alice LaPlante*

JULY 1992

502. "For Sale: One Cost Center, Slightly Used" *(Page 30)—Libbey-Owens-Ford's CIO bought the IS group. By Richard Pastore*

503. "More than Just a Pretty Interface" *(Page 38)—how GUIs can make users significantly more productive. By Mickey Williamson*

504. "Mature Technology" *(Page 48)—AARP uses technology to create a potent political force. By Meghan O'Leary*

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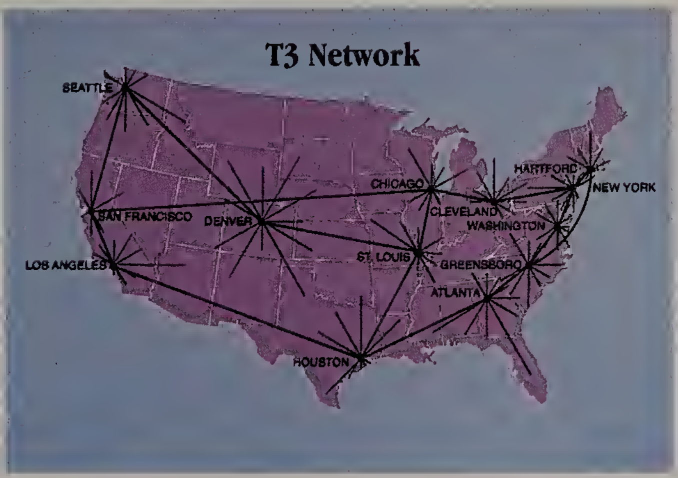

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505. "IT and the Powers That Be" *(Page 58)—how IT is changing the way the media industry operates. By Kathleen Melymuka*

506. "A Misguided Effort" *(Page 22)—an Outlook column on the futility of evaluating the bottom line. By Robert A. Waldman*

507. "A World of Difference" *(Page 25)—an Insights column on computer manufacturers' quest for quality. By L. Scott Flaig*

508. "Frontline" *(Page 64)—the coming generation of personal computing and communications devices. By Portia Isaacson*

509. "Getting Editors Off the Hook" *(Page 72)—a Working Smart column on an interactive voice-response system at CBS. By Megan Santosus*

AUGUST 1992

CIO-100 Special Issue

510. "The Shape of Excellence" *(Page 26)—exploring the impact organizational structure has on efficiency and performance. By Thomas Kiely*

511. "Retailing in Real Time" *(Page 34)—a profile of Wal-Mart's systems and replenishment process. By David Freedman*

512. "Flipping the Central Switch" *(Page 44)—transforming the structures at large functional companies; profile of Cooper Tire. By Leslie Goff*

513. "Divided We Stand" *(Page 50)—benefits of duplicating efforts at large portfolio companies; profile of Rubbermaid. By Richard Pastore*

514. "Winning Combinations" *(Page 54)—combination companies balance controlled and autonomous systems; profile of Harley-Davidson. By Richard Pastore*

515. "Fancy Footwork" *(Page 58)—small companies focus on core competencies; profile of Solectron. By Meghan O'Leary*

516. "Up-and-Comers" *(Page 64)—small service companies provide consistent service and customer ties; profile of Otter Tail Power. By Meghan O'Leary*

517. "Banking on the Basics" *(Page 68)—financial service companies focus on core businesses and customer service; profile of GEICO. By Kathleen Melymuka*

518. "The People's Choice" *(Page 74)—governments use technology like for-profit organizations; profile of Phoenix, Ariz. By Allan E. Alter*

519. "The Mightier Messenger" *(Page 82)—a State of the Art column on enterprisewide E-mail applications. By Dennis Livingston*

SEPTEMBER 1, 1992

520. "The Wrong Goodbye" *(Page 34)—how CIOs can ease the pain of outsourcing. By Thomas Kiely*

521. "Those Who Can, Teach" *(Page 46)—benchmarking gives IS managers the opportunity to study with the masters. By David Freedman*

522. "Silicon Valley Civics" *(Page 54)—a profile of information technology in Sunnyvale, Calif. By Allan E. Alter*

523. "A Fair Fight" *(Page 24)—an Insights column on comparing internal IS with an outsourcer. By Chuck Barkow*

524. "The Matter of Degrees" *(Page 30)—a First Person column on an MBA's IS education. By Linda Chow*

525. "Marshaling the Fax"*(Page 64)—a State of the Art column on computer-based faxing. By Judith A. Pirani*

526. "Frontline" *(Page 68)—the real opportunities of the desktop go beyond motion-video multimedia. By Portia Isaacson*

527. "A Finely Tuned Cash Flow" *(Page 76)—a Working Smart column on an EDI-based accounts-payable system at Bechtel Corp. By Megan Santosus*

SEPTEMBER 15, 1992

Strategic Outlook on End-User Training

528. "No Train, No Gain" *(Page 35)—organizations are finally wising up to the costs of neglecting training. By Meghan O'Leary*

529. "The Classless Society" *(Page 42)—some companies are looking for newer, sexier ways to educate end users. By Richard Pastore*

530. "Achieving Its Personnel Best" *(Page 48)—Chase Manhattan is building a smart user base by breaking down walls. By Richard Pastore*

531. "To Market, To Market" *(Page 52)—getting goods to consumers more quickly as product cycles diminish. By Kathleen Melymuka*

532. "Future Imperfect" *(Page 22)—an Insights column on the future of IS. By Michael Marien*

533. "All in IT Together" *(Page 26)—a First Person column on intercorporate information-sharing. By Gerald Long*

534. "Transacting Lessons" *(Page 58)—a State of the Art column on open and distributed online transaction processing. By Alice LaPlante*

OCTOBER 1, 1992

535. "The Power of Positive Shrinking" *(Page 30)—the decision to downsize is anything but clear-cut, and the stakes are high. By Richard Pastore*

536. "TV's Perfect Pitch" *(Page 38)—a profile of the Home Shopping Club's use of real-time sales information. By Meghan O'Leary*

537. "Teaching CPR to Health Professionals" *(Page 46)—how computerized patient-record systems can improve care and lower costs. By Allan E. Alter*

538. "Supporting Players" *(Page 26)—an Insights column on coalitions of networking companies. By Jack Martin*

539. "The Fine Print" *(Page 54)—a State of the Art column on advanced printer options. By Lucie Juneau*

540. "Frontline" *(Page 60)—the new freedom and flexibility of wireless communications technologies. By Portia Isaacson*

541. "Is There a Doctor Near the House?" *(Page 68)—a Working Smart column on mapping technology at The Travelers. By Megan Santosus*

OCTOBER 15, 1992

Strategic Outlook on the Database Dilemma

542. "Data, Data, Everywhere..." *(Page 31)—if you need to seamlessly integrate databases, there's hell to pay. By Megan Santosus*

543. "Keeping Your Info Honest" *(Page 42)—the importance of data integrity when it comes to distributed databases. By Thomas Kiely*

544. "Her Majesty's Data Guardians" *(Page 48)—a profile of the UK's Office of Population, Censuses and Surveys. By Thomas Kiely*

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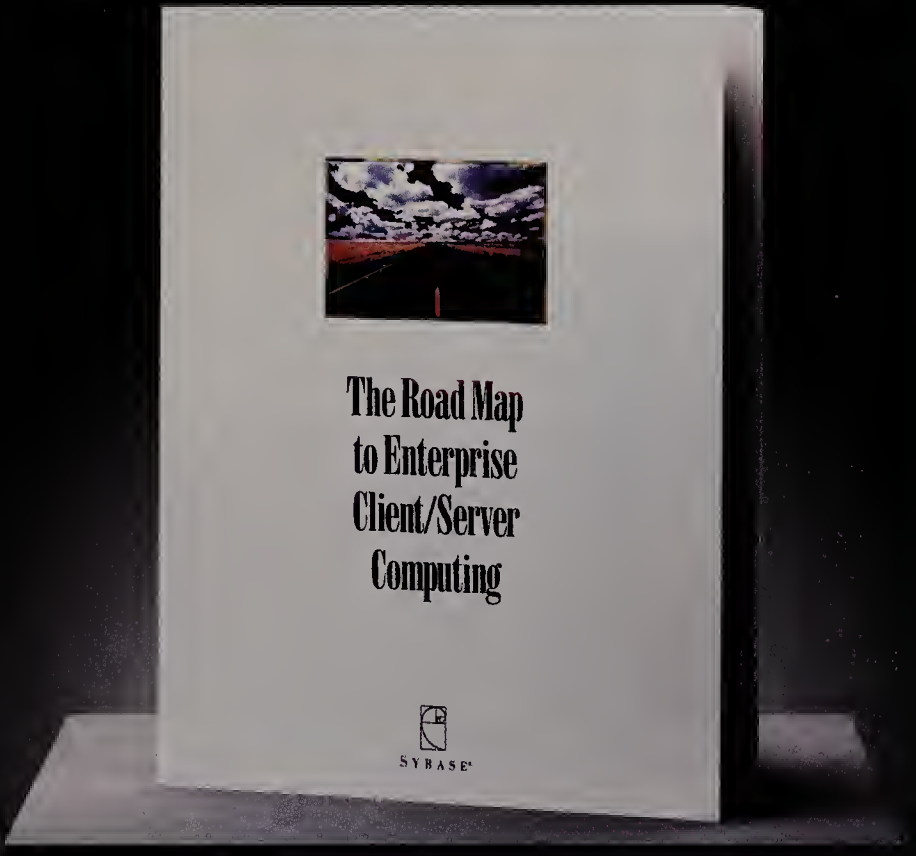

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545. "Model Citizen" *(Page 52)—an interview with Peter Chen, creator of the entity-relationship database model. By Thomas Kiely and Lew McCreary*

546. "Computing for a Cause" *(Page 58)—IS groups at some nonprofit organizations put their commercial counterparts to shame. By David Freedman*

547. "Dispersion Therapy" *(Page 26)—an Insights column on fully distributed databases. By Charles R. Ullrich*

548. "Information, Please" *(Page 66)—a State of the Art column on online services. By Megan Santosus*

NOVEMBER 1, 1992

549. "Information Alchemy" *(Page 32)—multimedia offers real improvements for delivering critical business information. By Dennis Livingston*

550. "The Ties that Bind" *(Page 44)—IS organizations team up with internal groups to develop a better understanding of the business. By Richard Pastore*

551. "Work in Progress" *(Page 54)—the hidden costs and problems plaguing client/server pilots. By Meghan O'Leary*

552. "The Untried and the True" *(Page 66)—CIOs need techniques to minimize the risks of dealing with small technology startups. By Richard Pastore*

553. "The Quality Quagmire" *(Page 28)—an Insights column on achieving significant gains from quality programs. By Robert H. Schaffer*

554. "Beware the Copy Cops!" *(Page 72)—a State of the Art column on establishing anti-piracy programs. By DeMarquis Walls*

CIO
How Customer Links Are Forging New IT Alliances
Client/Server Status Report

555. "An EDGE on the Competition" *(Page 80)—a Working Smart column on Countrywide Funding's automated loan-origination system. By Megan Santosus*

NOVEMBER 15, 1992

Strategic Outlook on IS Personnel

556. "Karate Shop" *(Page 38)—On Location: how ADDS Inc. uses a shop-floor system to strike a blow for U.S. manufacturing. By Thomas Kiely*

CIO
SPECIAL SECTION
STRATEGIC OUTLOOK ON I.S. PERSONNEL:
Getting A Read On The Talent Deficit

557. "People Who Need People" *(Page 47)—when the job drought improves, CIOs will be hurting for new talent. By Mickey Williamson*

558. "Improving Your Holding Patterns" *(Page 60)—CIOs trying to retain workers must deal with changing loyalties and priorities. By Mickey Williamson*

559. "The Correct Carrot" *(Page 66)—misusing the reward system may inadvertently discourage the right behavior. By Mickey Williamson*

560. "A Survivor's Story" *(Page 70)—how Meredith Corp.'s CIO outsourced IS services to EDS. By Mickey Williamson*

561. "Reengineering the Turf" *(Page 74)—as boundaries between users and IS are redrawn, CIOs face a new world order. By David Freedman*

562. "A Dual Approach" *(Page 28)—an Insights column on rebuilding the software infrastructure to support business-process redesign. By Laurence J. Best and Fred L. Forman*

563. "Magnifying the Problem" *(Page 34)—a First Person column on putting performance under a microscope at Hallmark Cards. By James R. Johnson*

564. "Mixed Messages" *(Page 82)—a State of the Art column on the confusion caused by networks of different communications products. By Walter Ulrich*

DECEMBER 1992

565. "The Object of Their Affection" *(Page 28)—where object-oriented technology fits into the real world. By Meghan O'Leary*

566. "International Affairs" *(Page 34)—a big network and state-of-the-art information systems will take you only so far in foreign markets. By Allan E. Alter*

567. "Pen and Inc." *(Page 46)—pen computers are moving beyond mere data collection. By Lucie Juneau*

568. "Preparedness Training" *(Page 24)—an Insights column on laying the groundwork for technology deployment efforts. By Chris Pickering*

569. "The Year in Review" *(Page 54)—an index of all major articles published in CIO in 1992*

570. "What a Card!" *(Page 64)—a State of the Art column on smart cards. By Megan Santosus*

571. "Frontline" *(Page 68)—a review of the best ideas of 1992 as well as a look into the future. By Portia Isaacson*

572. "Power to the People" *(Page 76)—a Working Smart column on end-user application development at Varian Associates. By Megan Santosus*

CROSS-REFERENCE BY ARTICLE TYPE

Technology Overviews *generally deal with current developments concerning individual technologies or groups of technologies:* 437, 446, 450, 455, 457, 458, 461, 462, 471, 475, 477, 480, 485, 486, 490, 492, 501, 503, 508, 519, 525, 526, 534, 537, 539, 540, 542, 543, 545, 547, 549, 551, 564, 565, 567, 570, 571

The CIO Role *runs the gamut from what parts CIOs play in specific undertakings to the politics of corporate maneuvering:* 432, 436, 439, 440, 460, 487, 488, 499, 523, 532, 560, 561

Management/Personnel Issues *include change management, management styles and professional development:* 436, 439, 442, 445, 451, 452, 454, 457, 466, 470, 472, 484, 500, 520, 521, 524, 528, 529, 530, 532, 552, 554, 557, 558, 559, 560, 568

Organizational Issues *range from the role of IT in the organization to the structures and processes of the organization as a whole:* 432, 434, 435, 439, 440, 458, 464, 465, 469, 472, 476, 479, 487, 495, 496, 497, 498, 499, 502, 506, 507, 510, 523, 535, 542, 550, 553, 561, 562, 566

Profiles of Organizations *offer in-depth looks at companies', governments' and other organizations' use of IT:* 448, 459, 468, 474, 482, 483, 494, 502, 504, 511, 512, 513, 514, 515, 516, 517, 518, 522, 530, 536, 544, 556

Industry Overviews *look at the use of IT within specific industries:* 489, 505, 537, 546

IT Strategies *cover the use of IT in pursuit of specific business goals:* 433, 441, 443, 448, 449, 451, 453, 459, 465, 466, 467, 468, 473, 474, 479, 480, 485, 488, 494, 495, 496, 497, 498, 504, 508, 510, 511, 512, 513, 514, 515, 516, 517, 518, 522, 526, 531, 533, 536, 540, 545, 546, 548, 549, 556, 562, 566, 567, 571

IT Implementation and Management *covers a wide variety of issues associated with bringing systems and applications into being and managing their use:* 433, 438, 441, 444, 446, 447, 448, 449, 451, 456, 457, 463, 465, 467, 473, 478, 480, 481, 482, 488, 490, 491, 493, 509, 527, 528, 529, 538, 541, 542, 543, 544, 545, 551, 552, 554, 555, 563, 568, 572

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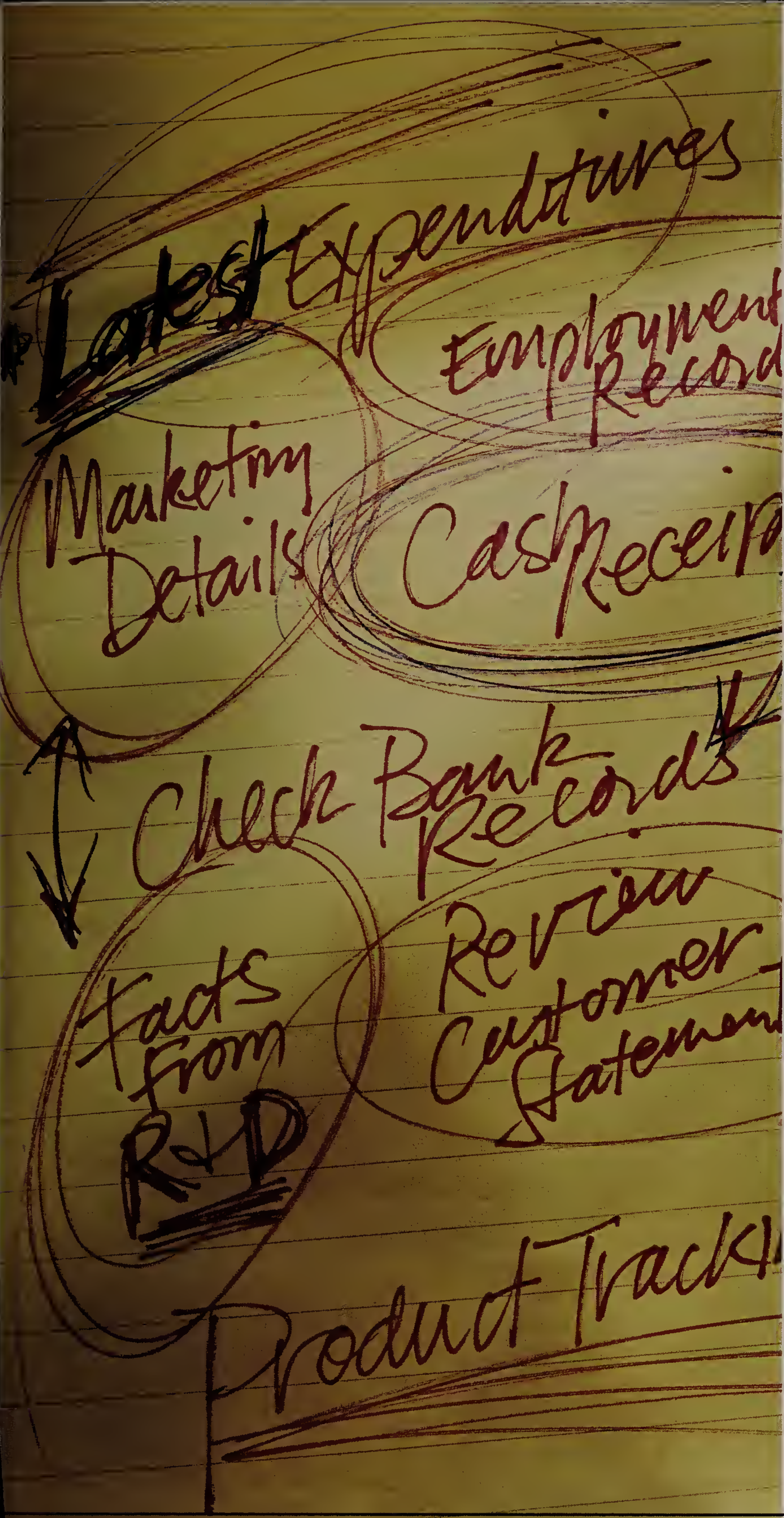

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You can use one to replace your rolodex, purchase airline tickets or rent a car. One variation pays tolls automatically from moving vehicles; another routes products through a manufacturing line. And they're way smaller than a bread box.

BY MEGAN SANTOSUS

Smart cards—credit-card-sized plastic cards containing memory chips capable of storing relatively large amounts of data—have been around for more than a decade. Now, following the successful completion of numerous pilot projects, the technology has matured to the point where it is a viable option for a variety of applications. As smart cards continue to prove their mettle—most notably in Europe and Japan—the time seems right for them to finally find their way into day-to-day IT applications.

The basic technology for smart cards has been around since 1975, when the technique for embedding integrated circuits (ICs) within a small piece of plastic was patented by Frenchman Roland Moreno. The first operational card was introduced in 1979, and vendors such as AT&T, Bull, Gemplus, IBM, Mitsubishi, Philips, Siemens, Schlumberger and Toshiba have since licensed the technology to develop their own smart-card-based products and systems. Because they contain one or more IC and communications interface, smart cards have a much higher capacity for data storage and therefore more functionality than conventional magnetic-strip cards.

The potential utility of smart cards goes beyond traditional ATM banking or calling-card applications to include transportation, pay television, manufacturing, security, medical and human services, marketing, shopping, travel and agriculture, according to Jerome Svigals, publisher of *Smart Cards and Comments*, a monthly newsletter produced in Redwood City, Calif. "A big area for smart cards over the next few years will be pocket and pen computing," Svigals said. "The technology will enable even the most computer-illiterate to perform sophisticated applications."

Several types of smart cards are available. Small-memory cards generally contain at least 256 bits of memory and are primarily used to replace coins in pay phones. Currently, about 80 million of these cards are in use, mostly in Germany and France where they can be purchased in the European equivalent of convenience stores.

Large-memory cards contain 256K of memory and are three-to-five times thicker than conventional bank cards. These are used primarily in handheld computers and personal digital systems for storing and accessing addresses and telephone numbers or running dictionary or language-translation applications.

Microprocessor smart cards are essentially handheld computers. They can contain up to 64 kilobits of memory and at least one 8-bit, single-chip microprocessor. The microprocessor smart card can feature either erasable, electrically programmable, read-only memory (EEPROM) for erasable and rewritable functionality, or electrically programmable read-only memory (EPROM) for one-time programmability. It can also include I/O capability with an alphanumeric keypad and LCD screen.

Microprocessor cards are the most functional smart cards available; they support multiple applications and can be programmed to "act" like several different credit cards. For example, Lufthansa is currently testing a smart card in Germany that offers customers nine separate applications including ticket purchasing, car rental, telephone access and frequent-flier updates. Even though the applications reside on the same card, they are independent of one another. The

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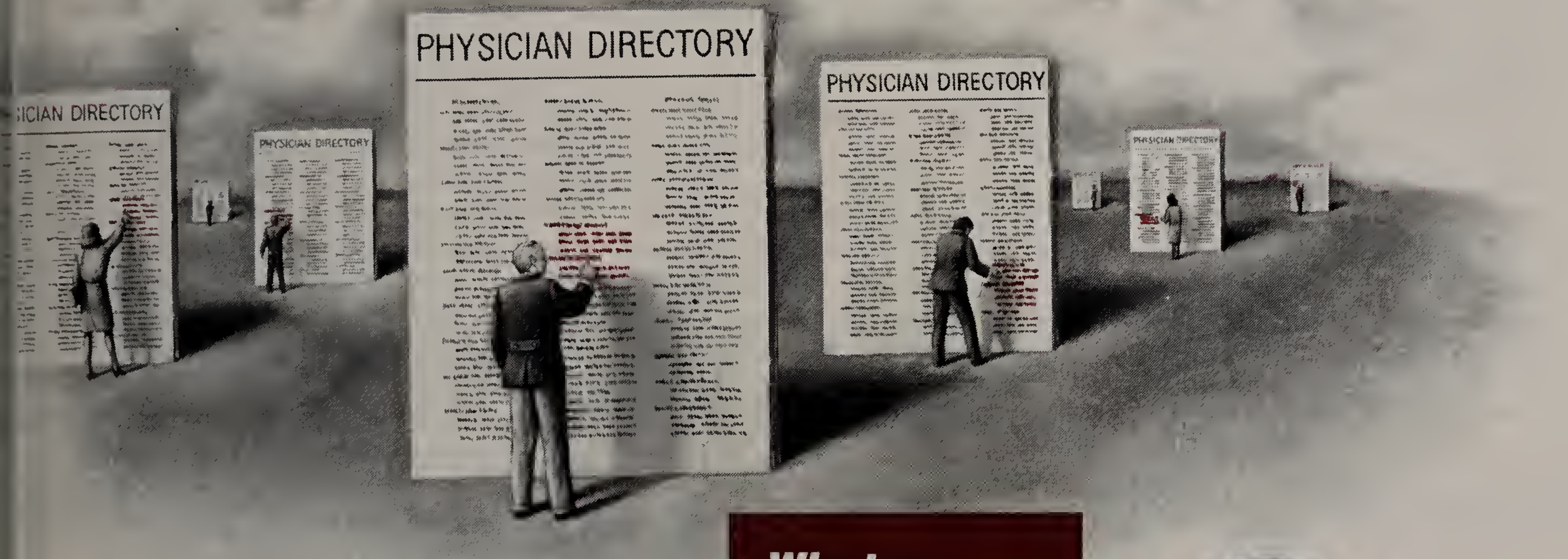

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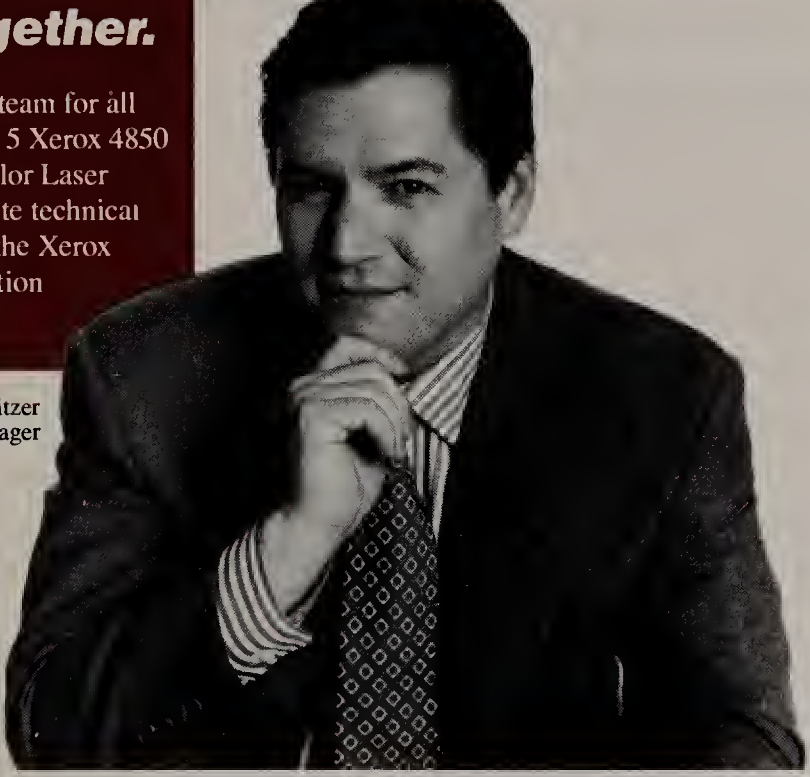

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card also provides Lufthansa employees with access to the company's internal management systems.

Data stored on smart cards is read and updated in a number of ways. Some cards require a desktop reader linked to a hardware device such as a PC, ATM, point-of-sale terminal or telephone. Others transmit data to non-contact readers located a specified distance away (there are short-, medium- and long-range non-contact systems). Manufacturers such as AT&T say that non-contact cards reduce wear and tear and the possibility of contamination and damage due to static electricity.

Non-contact cards work in conjunction with a communicator unit usually consisting of an antenna, a radio-frequency transceiver and a read/write transaction processor (the reader). Data processing devices may also be linked to the system, either directly or via telecommunications links. These systems are used in intelligent highway applications to automatically collect tolls from moving vehicles. The cards, which are mounted on the vehicles, act as prepaid accounts from which the tolls are deducted.

For five years, Buick has been using non-contact cards at a factory in Flint, Mich., to automate parts of the manufacturing process. Configuration information and manufacturing steps are loaded into the memory of a card that is mounted onto a vehicle chassis, according to Svigals. Remote sensors located throughout the factory floor "read" the card and automatically route the chassis through the appropriate production line. Production is synchronized with inventory control to enable just-in-time delivery of parts. Each chassis is linked by identification numbers to a corresponding lot of parts, and as it moves through the line, the parts are delivered when and where they are needed.

Smart-card applications are most prevalent in Europe. Many European countries have undertaken the overhaul of their telephone systems since smart cards were invented and have incorporated the technology into their design. In addition, most European PTTs are also involved in banking. With about 20 million microprocessor cards now in use, smart cards are starting to replace magnetic-strip bank cards.

In contrast, there is no such concerted effort to overhaul the U.S. telephone system, and there is a huge installed base of magnetic-strip cards in the U.S. banking industry. Converting to smart-card technology would be a massive and expensive undertaking. While bankers are for the most part satisfied with magnetic-strip cards, pressure is building for U.S. banks to switch over to smart cards as fraud losses continue to increase. Smart cards are much more difficult to counterfeit than their magnetic-strip brethren. In addition, data stored on smart cards can be encrypted, and security routines are easily changeable. Some cards are programmed not to work if three erroneous PINs or passwords are entered in a row, and readers can do what is called an "electronic handshake"—a kind of two-way security measure that checks if the entered card is authorized to be used in that particular reader.

One major stumbling block to smart-card acceptance in this country has just been removed. The major credit-card companies have until recently resisted the technology, claiming that purchasing and installing readers would be too expensive. (Svigals rejects this argument, saying that credit-card companies had a vested interest in remaining with the

Precisely Purveying Peanuts

. . . .

The USDA is using smart cards to track peanut farmers' sales quotas

The United States Department of Agriculture was one of the first domestic organizations to implement smart-card technology on a wide scale. Following a feasibility study in 1985 and a pilot project in 1986, the USDA created an electronic peanut-marketing network by integrating computers and telecommunications functions with smart cards. The network now includes 56,000 farmers and 565 buying locations. Micro Card Technologies of Dallas supplied both the readers and the smart cards.

Each year peanut farmers are issued cards containing their names, addresses, social security numbers, farm acreage, sales quotas, contract information and any outstanding liens, penalties or claims. When a farmer delivers peanuts to a buying location, the card is entered into a reader attached to an IBM XT. After weight and price information is entered, the amount of the sale is automatically subtracted from the quota on the smart card. The information on the XT is periodically downloaded to an IBM mainframe at USDA headquarters in Washington.

According to Dallas Smith, the director of the Tobacco and Peanuts Division, smart cards have vastly improved the peanut-marketing process. Before automation, farmers were issued 8.5- by 11-inch cardboard cards on which the information was manually written. At the end of the marketing season, the cards were sent to Washington for analysis. Any errors in quota or price were discovered only at this point—often several months after the peanuts had been sold.

With the smart cards, most errors are detected at the point of sale, resulting in lower administrative costs and improved service to customers. The USDA is in the process of upgrading to EEPROM cards with 24 kilobits (up from 8 kilobits) of memory, which will eliminate the need to issue new cards every year. *–M. Santosus* less-secure magnetic-strip technology because they do not have to pay for fraud.) But based on the success of smart bank cards in France, Visa International announced in September that it would support smart technology in the United States as one of several payment-service options.

"Smart-card systems have been developed in mature bank-card markets with relatively high telecommunications costs," said Roger Peirce, Visa's executive vice president of delivery systems. "Since telecommunications costs are the single biggest obstacle to online authorizations, the smart-card approach has proven to be an effective way to keep costs under control without jeopardizing card issuers' efforts to control their risks."

Throughout Europe, small-memory cards are used for telephones, parking, mass transit and toll collection. Using these cards is basically like buying money: They are prepaid in small amounts (about five to 10 dollars) and carry no identification of the individual using them, so losing one means losing at most the initial purchase price.

Small-memory cards cost between 80 and 90 cents to produce, compared to 50 cents for magnetic-strip cards, but according to Svigals, they more than pay for themselves. They are not easily counterfeited, and by replacing coins in phones and parking meters they practically eliminate theft and vandalism. Without coins, the cost of servicing and maintaining pay phones and meters is reduced by up to two-thirds. For banking transactions, no online charges are incurred, because authorization information is contained within the card, thus eliminating the need for a communications link with a central database. Efforts are also underway in 10 countries to develop a common-value card for use in telephones and transportation and for making small purchases.

A microprocessor-based smart-card application for a digital cellular phone system is currently being tested in Europe. The cards contain subscribers' identification and phone numbers and adhere to the Groupe Speciale Mobile (GSM) European digital standard for network communications. The card can be moved from phone to phone and country to country. Whichever GSM phone the card is inserted in acts like the user's home phone: Calls are automatically routed there, eliminating the need to forward calls or change numbers.

At the recent World's Fair Expo '92 in Seville, Spain, attendees were issued smart cards in place of tickets. Attendees inserted their cards into a reader that also checked their fingerprints, making cheating difficult if not impossible. Smart cards can also store digital signatures and voice and retinal scans and be programmed with personal identification number codes. Readers can provide additional security by verifying the validity of each card and auditing each transaction.

Soon everyone who goes to a supermarket may be able to use smart cards.

Toshiba uses its own multiple-application smart cards at company headquarters in Tokyo. Each employee is issued a card encrypted with identification, security, payroll and medical information. Typically the cards are used for controlling access to the building itself as well as to specific floors and offices (the card can even be programmed to control heating and lighting in intelligent buildings), and for debit purposes in the company cafeteria.

In conjunction with selected airlines, banks and telecommunications and retailing companies, Toshiba is testing Visa International's multiple-application SuperSmart Card. The 8K, single-chip EEPROM card features a keypad and 16-character LCD screen. Applications being tested include offline credit authorization, currency exchange, clock/calendar, notepad, travel information and telephone directory.

According to Peter M. Fallon, the national sales manager for Toshiba America Information Systems in Dallas, the SuperSmart Card's success in Japan shows promise for the U.S. market. "The cards will work well in any MIS applications which are currently online," he said. "And because they support multiple applications, companies can defray the cost of the cards by selling space on them."

Soon everyone who goes to a supermarket may be able to use smart cards. Advanced Promotion Technologies (APT) of Deerfield Beach, Fla., recently concluded a year-long test of The Vision Value Club, a smart-card-based frequent-shopper program similar to Green Stamps. In conjunction with participating consumer-goods companies, (including Kraft, Procter & Gamble, Ralston Purina and Sara Lee), Vision used smart cards to offer frequent-shopper points, credits, refunds, promotions, coupons and recipes. Shoppers inserted the cards into monitor-equipped readers at the checkout counters of participating stores. Points and purchase information were stored on the cards, enabling shoppers to cash in benefits at any Vision-equipped store and to take advantage of multiple-purchase promotions over time. For example, in a "buy three, get one free" promotion, the Vision card allows shoppers to redeem the offer even if they buy the product on three separate occasions and in different locations.

According to APT, test results showed a 9.2 percent increase in the average market share of participating brands. Last June, Banc One of Columbus, Ohio, agreed to jointly market with APT a program combining financial services with smart-card-based electronic marketing. The initial plan aims to establish a network of 2,000 participating supermarkets nationwide.

If successful, the APT rollout may indicate that smart-card technology has finally arrived. According to Toshiba's Fallon, "Interest in smart cards will increase dramatically once a big company makes a deal." CIO

FRONTLINE

BY PORTIA ISAACSON

Past is prologue. So it's probably a good idea to look both ways—backward and forward—before crossing confidently into the New Year. Herewith some estimable 1992 ideas, along with some ideal estimations of what the road to the Millenium will be like.

PHOTO BY WEBB CHAPPELL; ILLUSTRATIONS BY ROBIN JAREAUX

That Wonderful Year

A FEW GOOD IDEAS

You, the CIO, and I, the consultant, deal in ideas. Before we migrate to 1993, let's reflect briefly on 1992's "10 Most Valuable Ideas" as the foundation for taking another step forward. We'll also touch a hesitant toe into the future as I present predictions of events, products and ideas that will provoke visions, insights and questions.

CIOs—whether they are business architects, innovators, change agents, reengineers, technology forecasters, visionaries, entrepreneurs or CEOs in IS clothing—thrive on a steady supply of innovative ideas that promise added value for the enterprise. Outstanding CIOs draw their ideas from two distinct pedigrees: leading-edge management thinking and accurate visions of information technology. These they blend in just the right proportions, and with just the right timing, for their companies and industries. No easy task.

If being a CIO were easy, anyone could do it.

Of the management and IT ideas that were hot topics in 1992, I have ranked those that I believe will be the most valuable and enduring in descending order of greatest likely five-year value. Accompanying the ideas are some of their primary products and/or champions:

1. Downsizing: Uncountable experts can't be—and aren't—wrong.

2. Client/server computing: If it's not a PC, it must be a server. IBM has repositioned mainframes as servers. See also the Compaq SystemPro, NetFrame and NCR System 3000.

3. Graphical user interfaces and graphical applications: Macintosh, Windows, Microsoft Word and Excel, PageMaker, Persuasion, CorelDraw, AutoCAD, Paradox.

4. High-support, low-price PCs from vendors with customer commitment, JIT manufacturing and efficient distribution: Dell Computer Corp. embodies the highest attainment of these skills.

5. Notebook, laptop or handheld PCs instead of desktops: BCC Avanti, Toshiba 4400SXC, NCR Safari, Macintosh PowerBook, HP 95LX.

6. Pen computers can replace paper forms, never mind the analyst naysayers; the pen-and-paper metaphor as user interface: GRiD PalmPAD, NCR 3125; PenPoint, Windows for Pen Computing, Numero, Day-Timer Personal Scheduler from Slate, Ink Development's NoteTaker.

7. Workgroup computing: Lotus Notes.

8. LAN-based imaging, computer-based fax and fax document management: LaserData, ViewStar, Xerox PaperWorks, Caere FaxMaster, WinFax Pro, TeleForm.

9. Reengineering: Michael Hammer.

10. Wireless communications: WaveLAN from NCR and Solectek, ARDIS, Proxim, Photonics.

In making these selections, I started with nearly 100 candidates. Ideas that missed the cut included outsourcing, E-mail, open systems, optical storage, PC Cards and multimedia. In time some of the also-rans will move up onto a future list; others will move down and fade into buzzword oblivion.

In making these selections, I started with nearly 100 candidates. In time some of the also-rans will move up onto a future list; others will move down and fade into buzzword oblivion.

The ideas include both management and information technology ideas. They have in common the fact that each will provide billions of dollars in value to organizations over the next five years. But they differ on nearly every other axis of comparison.

Some are more mature than others. (Downsizing is a mature concept even if implementation details can still terrify; but reengineering is far from well-understood.) Some are valuable despite being obvious (the fact that high-support, low-price PCs from vendors with efficient manufacturing and distribution will save you money). Other ideas—for instance, using notebook PCs as alternatives to desktops—are valuable because they can directly increase value for customers. And some ideas are related to others: At some companies workgroup computing can be the enabler for reengineering.

Like all lists, this one is subjective. Yours would be different, depending on your particular industry or enterprise. I recommend that every CIO maintain an idea list geared to his or her own business drivers. Keep it simple. It's OK for ideas to intersect. Ideas, like flags, are rallying points for attention and action. For each idea

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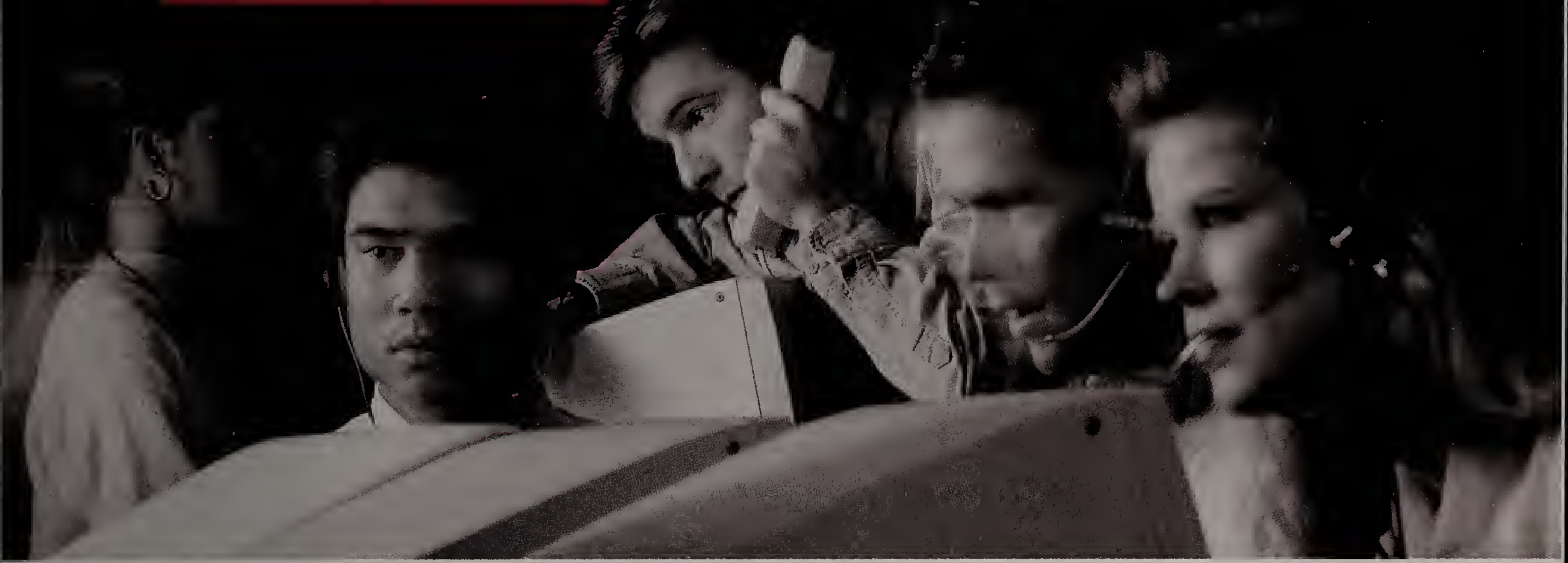

As you read this, mail-order giant DAMARK International is moving 16 camcorders, 12 garage door openers, 8 kiddie cars and now 6 more camcorders…but wait! We can't write this fast enough to keep up! Fortunately, Fujitsu's F9600™ telephone system can. Its non-blocking architecture instantly switches all calls through, at which point its ACD software routes these calls to "next available agent" to minimize waiting time. And no matter how fast DAMARK International grows – sales jumped from $1.3 million in 1986 to $214 million in 1991! – the F9600's modular 50- to 9600-line PBX grows right along with it. Best of all, the F9600 is ISDN-ready to ID future callers by phone number so their files can be called up on-screen before the agent comes on. *"Hi, Mr. Jones. How did you like those golf clubs?"* replaces *"How can I help you?"*

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Up-to-the-Millenium News

A FEW GOOD PREDICTIONS

Now for a sampling of predictions and possibilities for information technology and its applications each year until the year 2000. Underlying these specific predictions are some powerful trends in the computer industry: an apparently unquenchable demand for more IT; abundant vendor competition and entrepreneurial wealth; relentless technology advances and a rapid acceleration of technology succession; enterprise dependency upon systems (with systems in effect *becoming* the enterprises they serve); and finally, the growing power of buyers.

Here, then, is the future. With each prediction I give my best estimate of its probability:

1993

- Notebook computers based on Intel 486SL processors become common, advancing the trend toward purchasing notebooks instead of desktops as primary computers; *95%.*
- Desktop computers based on Intel's P5 will feature 100 MIPS performance and a 64-bit data path; *90%.*
- Less-than-$1,000 pen-based handheld PDAs with the power (but not the display size) of 1992's notebook computers will be shown by Apple, IBM and several others. Although positioned primarily as consumer products, the business utility of these IT miniatures is obvious; *95%.*
- Downsizing rages through large and mid-sized companies with the focus shifting even more strongly to PC LANs as opposed to minis; *90%.*
- OS/2 gains ground as we wait for Windows NT. Several leading suppliers of desktop systems (NCR, Compaq, Dell, NEC, for example) license OS/2 to supply to their customers who request it; *50%.*
- Michael Hammer makes the cover of Time as his long-awaited book on reengineering breaks all records for a new release of a business book; *30%.*
- IBM divests its Personal Systems division; *60%.*
- As Digital continues its downward slide, several suitors are rumored (possible candidates include HP, AT&T, Fujitsu); *40%.*

The day IBM gives up on the PC business—it will be only a matter of time.

1994

- Dell, fueled by its well-supported customers and efficient direct channel, becomes the leading supplier of Windows desktop PCs in the United States; 40%.
- Microsoft's Windows NT is a hit, and enormously better than most CIOs dreamed. MVS and VMS pale in CIO-land; *50%.*
- Toshiba increases its lead in notebook computing by leveraging its captive active-matrix color LCD technology; *70%.*
- PCMCIA PC Cards are widely available. They offer memory, modems, rotating storage and semiconductor storage on credit-card-size cards that plug into computers and consumer electronic devices; *90%*

1995

- Sharp, the leading supplier of monochrome LCDs for notebook computers, gives priority to its own notebook computer line. U.S. manufacturers lobby for government intervention; *10%.*

- Compaq, having tried every other way imaginable to sell its computers, creates a multilevel marketing organization supported by clever financing and training; *5%.*
- Apple licenses IBM to build Mac-compatible PCs and offer the Macintosh Operating System; *5%.*
- HP shocks the personal computer market with an innovative product line that includes handhelds, notebooks, pens, desktops and LAN servers with blow-away HP technology, especially mass storage, in every system and all at an aggressive price (a la LaserJet); *15%.*

1996

- The value of the proven, entrepreneurial, frontline CIO increases as companies realize (1) the value of frontline IT in building business structures and (2) how many roads lead to IS-from-hell; *100%.*
- A consortium of human-resources managers asks leading software vendors to offer user-certification for proficiency at several levels to assist in qualifying job applicants. Application competencies have become as essential as college degrees in some professions; *40%.*

1997

- Xerox, captivated by the success of Lotus Notes (now the dominant LAN-based imaging, document management, rich E-mail and faxamation system), recognizes the synergy with its workgroup printers/copiers/faxers. A merger is rumored. Not surprisingly, Kodak and HP are also making moves; *5%.*

1998

- Over 50 percent of all computers purchased by business in the United States are portables; *60%.*

1999

- Thirty percent of CIOs in the United States are women; *0%.*

2000

- Name a computer company... Apple, AT&T, Dell, NEC. Hey, remember IBM? Yes, but IBM isn't really a computer manufacturer anymore; *10%.*
- AT&T is the world's largest systems integrator; *15%.*
- *CIO* magazine is one of the most widely read publications by CEOs—most of whom were once CIOs; *70%.* CIO

Portia Isaacson is president of Dream IT Inc., headquartered in Colorado Springs, Colo., a consultancy, publisher and workshop producer dedicated to providing quality information to customers and creators of frontline IT.

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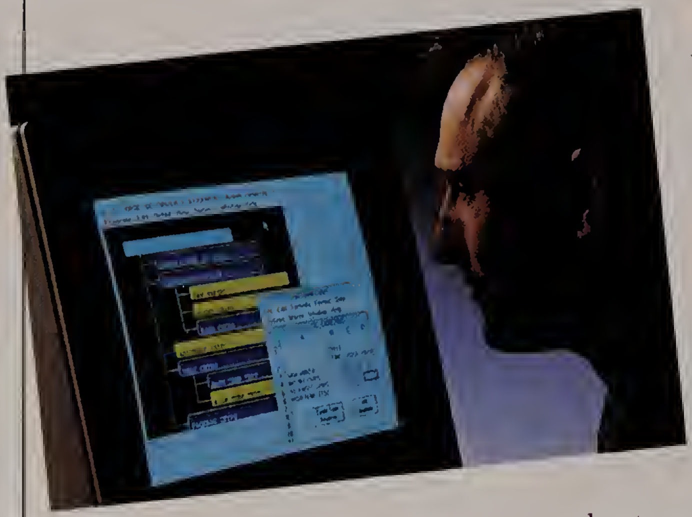
Building a Better Process



Yes, business process reengineering is a worthy goal. No, it isn't easy to do. However, there are some products on the market that offer aid. One of the newest is Texas Instruments Inc.'s Business Design Facility (BDF), a workstation-based software tool that illustrates existing business processes with diagrams and metrics and contrasts them with alternative, reengineered process scenarios. Users can assess the performance of existing and redesigned practices by building graphic models of each that show costs, value-added benefits and internal business-unit interrelationships. A key feature of the tool is its ability to look across organizational boundaries and help users recognize how relationships between functional units can be improved.

BDF, originally developed for in-house use at TI, links with popular spreadsheets and word processors as well as with TI's own IEF CASE product. It sells for $5,000. For more information, call TI at 214 575-5599.

Overcoming the Conventions

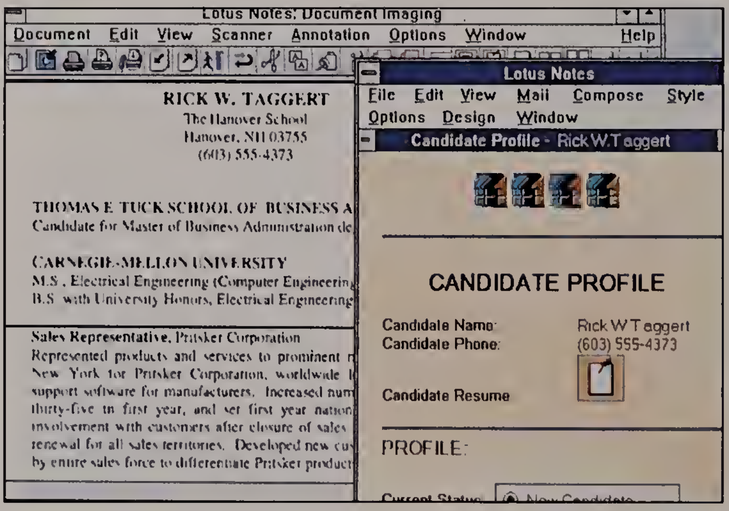
You don't have to be a character from *Cool Hand Luke* to utter the immortal line, "what we have here is a failure to communicate." Any CIO trying to integrate disparate E-mail platforms has probably said as much. Technology Development Systems has designed a new product to make switching incompatible E-mail messages a breeze.

NetSwitch is a LAN-based message, data-file and document switching system that runs under OS/2 in conjunction with NetWare or LAN Manager. The product is OSI-compatible and incorporates industry-standard message protocols, such as X.400, as well as proprietary message protocols, according to the company. In addition, NetSwitch allows mail-enabled applications to be implemented among disparate data platforms.

NetSwitch can start as a single PC linking a proprietary E-mail platform to X.400 or MHS and grow to handle switching among any number of proprietary or standard platforms. Pricing starts at $9,000 for a two-platform system. Call 708 382-9191.

E-Mail Imaging

Like everything else in this heady election year, image processing has gone populist. Priced at only $295 per seat, Lotus Notes: Document Imaging (LN:DI) takes a technology that was once the exclusive province of expensive, mission-critical applications and moves it to common desktop applications.



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Candidate Name: Rick W Taggert
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A Lotus Notes companion product, LN:DI works with Lotus Notes Version 2.1 and will be upwardly compatible with future Notes releases. Images such as presentations, contracts and news articles can be stored in LN:DI's mass storage system or embedded in a Notes database. Imaging software is stored on the Notes server and on each Notes client, with the server handling requests to the mass storage system and the client handling image manipulation. These images, when combined with Notes' ability to share electronic information, allow paper-based documents to become just another data type within desktop computing.

LN:DI is the result of a joint development agreement between Lotus and Imagery Inc., a subsidiary of Eastman Kodak. Call 617 577-8500.

Radio Days

Wireless computer users can now hook up to standard TCP/IP applications, thanks to new technology offered by RAM Mobile Data and TEKnique Inc. RAM builds and operates multiuser wireless data networks that cover the nation's major urban areas. (RAM is the sole operator in the U.S. of Mobitex, an international wireless standard; the network technology is supplied by Ericsson.) Essentially, laptop computer users, equipped with a RAM radio modem and linked to the RAM network, can "dial in" to the home office, sans telephone lines. (Tune into databases from a plane, from a busy restaurant, even from your car as you chat with a client over the cellular phone.)

Hitherto, wirelessly accessing applications on a distributed TCP/IP network could be tricky. Not anymore. The Mobitex Packet Driver, developed by TEKnique, allows developers of TCP/IP applications to adapt their products easily with Mobitex. The driver works cooperatively with RAM's Mobigate service, an interface for TCP/IP networks using X.25 protocols. In addition, TEKnique offers an optional router to connect RAM networks with TCP/IP networks over X.25, SLIP, Ethernet or PPP pathways. For pricing and other information, call 800 MOBITEX.

CIO

INDEX

Page numbers refer to the first page of the article(s) in which the company is mentioned. This index is provided as a service to readers. The publisher does not assume any liability for errors or omissions.

Company Index

AT&T 64, 68
AT&T Bell Labs 28
Advanced Data Research 46
Advanced Promotion Technologies . 64
Allianz Insurance Corp. 14
Apple Computer Inc. 46, 68
Banc One 64
Bankers Trust 74
Banyan 76
Bell Sports 34
Borland International 28, 46, 76
Brooklyn Union Gas 28
Chase Manhattan Bank NA 14
Chrysler Corp. 46
Cigna Corp. 14
Citicorp 74
Communication Intelligence Corp. . . 46
Compaq 68
Dell Computer Corp. 68
Digital Equipment Corp. 14, 34, 68, 74
Dream IT 46
Encyclopaedia Britannica Educational Corp. 74
Exabyte 34
Federal Express 34
Forrester Research 46
Free Press, The 74
General Cinema 74
General Electric 74
GO Corp. 46
GRiD Systems Corp. 46, 68
Hewlett-Packard 14, 68
HyperDesk Corp. 28
IBM 14, 28, 34, 46, 64, 68, 76
ICI 74
Ikea North America 34
Imagery Inc. 72
Informative Graphics Inc. 76
Intel 68
International Resource Management 14
Kraft 64
Kubota Ltd. 34
Lotus Development Corp. 68, 72
Lufthansa 64
McGraw-Hill Inc. 14, 74
Merrill Lynch 14
Micro Card Technologies 64
Microsoft Corp. 46, 68
NCR Corp. 34, 46, 68
NEC 46, 68
Neodata 14
Nissan 74
Norand 74
Object Management Group 28
PRC Engineering Systems Inc. 46
Pen Pal Associates Inc. 46
Procter & Gamble 64
Ralston Purina 64
RAM Mobile Data 72
Salomon Brothers Inc. 14
Sara Lee 64
Sears 74
Selectron 74
Sharp 46, 68
Slate Corp. 46, 68
Sony Corp. 34
Technology Development Systems . 72
TEKnique Inc. 72
Texas Instruments Inc. 28, 72
Toshiba 64, 68
Toys 'R' Us 34
Training Edge, The 74
USAA 74
Unisys 34
Unum Life Insurance Co. 28
Varian Associates 76
Visa International 64
Wal-Mart Stores Inc. 14
John Wiley & Sons 14
Xerox 28, 68, 74
Zinc Software Inc. 46

Advertiser Index

AT&T 22
AT&T Technologies 38
Advanced Network Services 57
Andersen Consulting 33
Applied Business Technology 11
Ardis C3
BMC Software 17
BT North America 43
Bell Atlantic 44
CIO Publishing Inc. 4
Computer Associates Intl. Inc. . . 7, 41
Digital Equipment Corp. C2
EDS 26
Encore Computer Corp. C4
Fujitsu Ltd. 51, 69
GRiD Systems Corp. 71
IBM Corp. 63
Information Builders Inc. 15
Information Resources Inc. 21
Informix 19
Intellicorp 75
National Education Training Group . 55
New England Telephone (Regional) 14A
Northern Telecom Inc. 2
Programart Corp. 25
RAM Mobile Data 52
Sybase 61
Syncordia 9
Texas Instruments Inc. 12
Unisys Corp. 58
Xerox Corp. 65

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OFF THE SHELF

BENCHMARKING

Produced by the Encyclopaedia Britannica Educational Corp., sponsored by the International Benchmarking Clearinghouse, and distributed by The Training Edge (Palatine, Ill.), 1992
47 minutes; $1,495
(Also available for rent: five days, $250; one day, $100)

It is becoming common practice to examine other organizations' processes in order to improve one's own. This program offers a good overview of benchmarking, what it is supposed to accomplish and how to go about it. Companies in various stages of the benchmarking process (including Norand, USAA, Selectron and DEC) effectively illustrate the steps involved.

The program is delivered on three tapes (we assume for marketing purposes, given that the tapes average only about 15 minutes each; The Training Edge offers the three tapes for sale, rent or preview individually too). Carla O'Dell, director of the International Benchmarking Clearinghouse, introduces and closes each section.

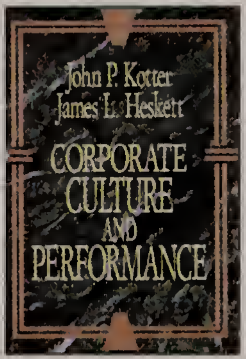
The first tape describes the use of benchmarking as a quality-improvement tool and shows two teams going through the process of setting goals and objectives. The second deals with how to find and enlist worthy benchmarking partners and prepare for site visits. The last examines the steps involved in developing and implementing a continuous-improvement strategy based on sound benchmarking practices.

Benchmarking shows participants (generally not executive types) in the thick of their planning meetings and site visits. Xerox's Robert Camp, one of the pioneers of American benchmarking, offers commentary and insight throughout. It's a high-quality program, with good production values, and it would make a fine starting point for any organization's benchmarking efforts. However, if it's meant to be used in conjunction with in-depth training (which a less-cynical interpretation of the three-tape format and five-day rental option would suggest), it could use more support material.

As for the purchase price: While we realize that management and training videos are justifiably a bit more pricey than, say, *Terminator 2*, we really think that $1,495 for 47 minutes of anything—that's $31.80 a minute—is a bit excessive. Maybe it would be worth it to a large organization with multiple sites. Still, $31.80 a minute. . . .

CORPORATE CULTURE AND PERFORMANCE

By John P. Kotter and
James L. Heskett
The Free Press (New York), 1992
214 pages, $24.95



What will be the long-term impact of organizational culture on the economic performance of a corporation? Harvard Business School professors John Kotter and James Heskett spent four years researching the topic, and their intriguing conclusions are lucidly summarized in this fascinating little tome.

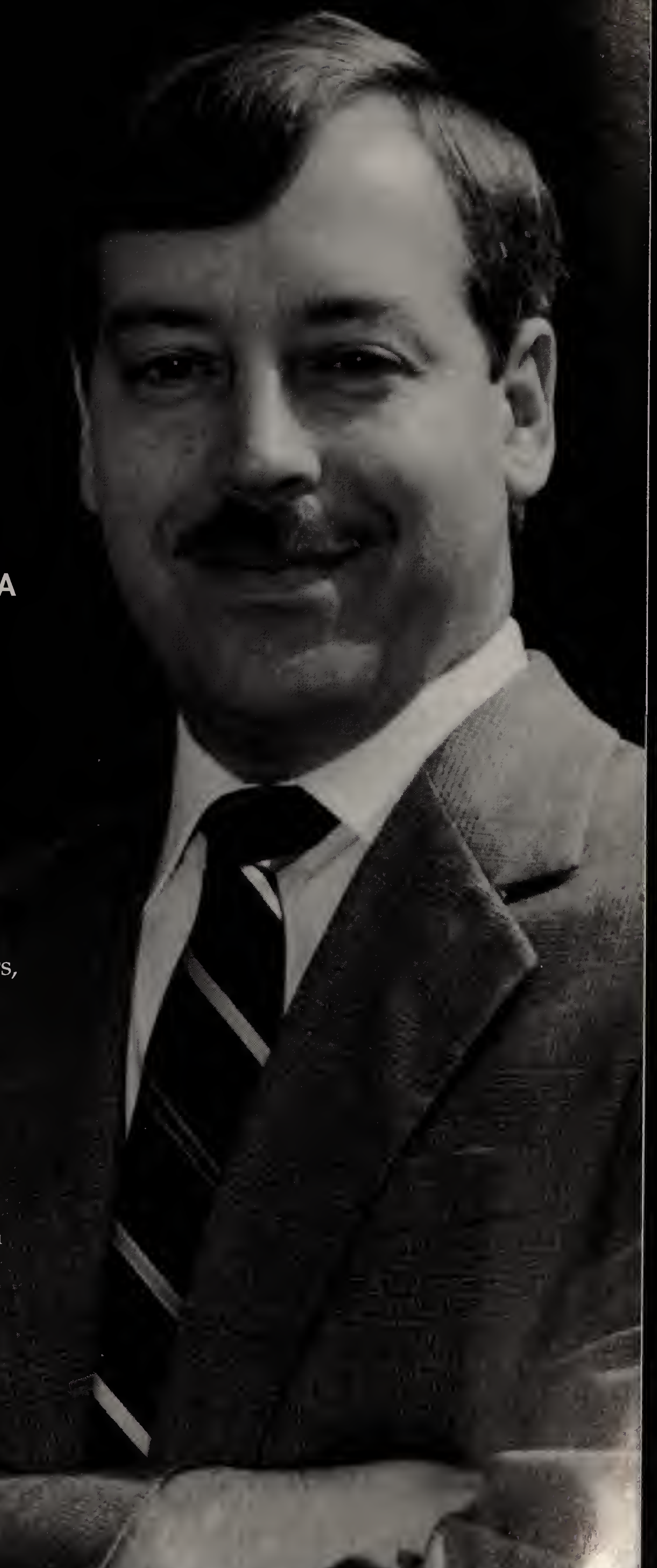
Briefly, Kotter and Heskett argue that the right kind of corporate culture certainly can influence performance. Among the 207 companies the authors examined, those whose cultures honored three key managerial constituencies—stockholders, customers and employees—significantly outperformed companies with flawed cultures. Over an 11-year period, this cultural elite increased revenues by an average of 682 percent (versus 166 percent for the culturally dysfunctional), improved net incomes by 756 percent (versus 1 percent) and saw their stock prices rise 901 percent (versus 74 percent).

However, the authors debunk the prevailing belief among managers that a strong culture is a performance turbo-booster. (A strong culture will focus an organization and motivate employees, proponents of this perspective argue.) Kotter and Heskett discovered that a few companies with weak cultures—such as McGraw-Hill and General Cinema—were among the top performers of the decade. Moreover, many companies with strong cultures have marched fervidly down the wrong road. And other companies, such as Citicorp and Sears, developed strong cultures during periods of heady growth—then tripped over their own cultural feet when market forces changed.

Kotter and Heskett also poke holes in the theory of cultural "fit" (as in: An entrepreneurial culture may be appropriate for a small high-technology startup, while something more conservative better suits an insurance company). Yesterday's fit rarely works tomorrow, they note. In companies where the content of the culture seems well-suited to the business, managers can become blind to facts that don't match cultural assumptions. An entrenched culture can obstruct the implementation of new strategies.

In contrast, firms that are steeped in a culture where managers initiate change and take risks are able to adapt better to change. If managers pay close attention to their three key constituencies, the authors argue, "and create and implement strategies that are sensible in light of constituency needs," the organization should thrive. "The values of a culture of this kind may sound commonplace to some, but they are far from the norm today."

Fortunately, an organization with a dysfunctional culture can transform itself. Citing companies like Bankers Trust and General Electric, Kotter and Heskett spell out many of the elements necessary for successful cultural change and provide detailed case stories of change—and change leaders—at ICI and Nissan.



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INTELLICORP

Power to the People

Giving users the ability to generate their own applications may seem like a rash thing to do. At Varian Associates, the practice has been a big success.

Sometimes the best solution to a nagging technical problem is already at your fingertips. While working in R&D at diversified high-tech manufacturer Varian Associates in Palo Alto, Calif., Terry Martin became frustrated with the mainframe database system. Instead of throwing lots of money at new technology, Martin used a homegrown application to quickly generate reports. In the process, he found that his application helped improve the company's business processes by encouraging end-user application development.

Previously, the flat-file mainframe database system sorted data according to time of input. Finding specific data often required reading the equivalent of several pages of text. Martin experienced this problem while involved in Varian's quality-review process, in which employees regularly write "corrective action requests" detailing ideas for improvement. Martin, who was often assigned to resolve the requests, decided he had had enough of the existing system.

"It was the classic corporate problem of figuring out how to use technology to generate reports better," he said. In two hours he built an architecture and downloaded the data from the mainframe. Then he showed the quality administrator how to write reports using the software he had created for his personal applications.

Martin came across similar situations where users could benefit from the application, and he realized that he had stumbled upon a concept that could improve business processes. "If you give people in the company the knowledge of what an application is supposed to do, and if you give them quick guidance and an application-development tool, they can write better applications than the MIS department," he said.

Last year, when Martin became CIO of the $1.3 billion company's Semiconductor Equipment Business Unit (SEBU), he put this theory to the test by making his software available to 200 end users over the division's Banyan network. Dubbed DataTrak, the current version of the application-generator is based on Borland International's RDBMS dBASE IV Version 1.5.

VITAL STATISTICS

Organization: *Varian Associates Inc., Palo Alto, Calif.*
Application: *Application generator*
Technologies: *Network of 200 PCs and Macs running dBASE IV and Myriad for DOS file-viewer*
Scope: *200 employees in the Semiconductor Equipment Business Unit*
Sponsor: *CIO Terry Martin*
Objective: *To save money and time developing applications*
Payoff: *Improves business processes and empowers employees by facilitating end-user application development*

DataTrak has been used to build more than 60 user-defined applications, including 20 customized reports. Most applications can be written within 24 hours (compared to a month on the mainframe), and one simple application was developed in just 30 minutes. Among the applications are a document-control system for SEBU's crucial engineering drawings and an order-entry system that allows the marketing department to check off any of the 100 available product options and generate a complete order.

When Martin realized that both the document-control and order-entry systems relied on common data and processes, he integrated them. Each product option now has a corresponding part number, and when a specific option is selected, the information is immediately available to manufacturing. The document-control system incorporates the Myriad for DOS file-viewer from Informative Graphics Inc., which provides immediate electronic access to 7,000 engineering drawings. (Plans are in the works to scan up to 8,000 more drawings into the system.) Previously, employees had to physically locate paper-based drawings and assemble them in books.

Most of DataTrak's users are administrative employees who have enthusiastically incorporated traditional IS functions into their job roles. After a DataTrak training class, Martin said that 40 percent of the attendees approached him with suggestions about using the system in their own departments.

"Our system puts the power into the hands of end users," Martin said. "The final benefit is that when someone creates a good application, we can put it on the network."

–Megan Santosus

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